APPENDIX C

AUDIT REPORT

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1.0 Formation of the NPDES Program

In the mid-1950's, the nation began to see dramatic decreases in the quality of surface waters due to lack of wastewater treatment and polluted storm water runoff. Cities were growing at a rapid pace creating unprecedented urbanization. Increases in population and the expansion and construction of local industries were placing a heavy burden on local waterways. Municipal and industrial wastewaters were being pumped into the same waterways that were being used for potable water supplies, fishing, and recreation. Pollution of local waterbodies threatened fish and wildlife, decreased aesthetic value, and began to be viewed as a serious threat to public health. Raw municipal and industrial wastewater was the most obvious culprit and in the 1960's, the nation began experimenting with methods of wastewater treatment. In an effort to get a handle on the growing problem, Congress passed landmark legislation that is now known as the Clean Water Act in 1972.

The Clean Water Act (CWA) is the primary federal legislation that protects surface waters, such as lakes, rivers, and coastal areas. The CWA is the current, revised version of original federal environmental legislation entitled the Water Pollution Control Act (WPCA), which was enacted in 1948. This legislation utilized ambient water quality standards to specify acceptable levels of pollution in lieu of preventable causes of water pollution. This approach was proven to be an ineffective method to prevent pollution. Additional problems encountered with WPCA included ambiguous federal and state responsibilities for promulgating the standards and cumbersome enforcement methods.

In 1972, the CWA was enacted to strengthen and expand the role of the WPCA. The CWA implemented measures, which were focused on establishing effluent limitations on point sources, or "any discernable, confined, and discrete conveyance… from which pollutants are or may be discharged". Additional measures employed by the CWA included the following items:

- Increased accountability for dischargers of pollutants;
- Required states and tribes to survey their waters and determine the appropriate use for each, followed by the implementation of specific water quality criteria for various pollutants to protect the identified uses; and
- Provided certain funding mechanisms to assist communities in achieving clean water goals.

The primary focus of the Clean Water Act was to "prohibit the discharge of any pollutant to waters of the United States from a point source unless the discharge is authorized by a National Pollutant Discharge

Elimination System (NPDES) Permit". Initial point sources targeted for permitting included municipal and industrial wastewaters. The legislation proved beneficial as substantial increases in water quality were experienced nationwide. However, increases in the quality of surface waters were not as dramatic as expected. In the late 1970's and early 1980's, it became increasingly evident that there must be other sources contributing to water quality degradation. Storm water runoff or non-point source (NPS) pollution was identified as the likely source of the harmful constituents. Various NPS studies such as the National Urban Runoff Program (NURP) were conducted in the 1980's that confirmed these suspicions. Storm water runoff contained many of the same pollutants that were now regulated under NPDES wastewater permits. Therefore, in 1987 Congress passed the Federal Water Quality Act directed solely at NPS pollution from storm water runoff.

20 NPDES Storm Water Management Program

In 1987, EPA developed a comprehensive, two-phased program to regulate *storm water* discharges under the NPDES permitting program. The NPDES program requires that a direct discharger of a pollutant into waters of the United States must obtain an NPDES permit. The NPDES Phase I rule, which was issued in November 1990, addressed storm water discharges from medium to large municipal separate storm sewer systems (MS4s), which were communities serving a population of at least 100,000 people. In addition, permit requirements were placed on storm water discharges from eleven classes of industrial activity including land disturbance (construction) activities.

The NPDES Phase II rule, which was promulgated in December 1999, addressed small municipal separate storm sewer systems (SMS4s) serving a population of less than 100,000 people in urbanized areas. Per 1990 Census data, the City of Charleston is one of forty-six communities in the state of South Carolina automatically designated into the NPDES Phase II program. In the state of South Carolina, EPA has delegated the South Carolina Department of Health and Environmental Control (SCDHEC) as the state permitting authority.

The regulatory provisions contained in State Regulation 61-9.122 and 124 implement the NPDES program under sections 318, 402, and 405 of the Clean Water Act and the South Carolina Pollution Control Act. In accordance with State and Federal enabling authority, SCDHEC has been pursuing the general permit approach to regulating SMS4s.

The first draft of the general permit was issued by SCDHEC in May 2002. This draft was incomplete and poorly written. Subsequent to numerous inquiries concerning its requirements, the draft was retracted by SCDHEC along with a promise of a revised draft by August 2002. The next draft was presented by SCDHEC to the South Carolina Association of Stormwater Managers (SCASM) September 6, 2002 at a regularly scheduled meeting. This draft was immediately revised and re-issued September 12, 2002 due to an incorrect compliance schedule included in the September 6 version. Although this draft was in the hands of the regulated community in September 2002, SCDHEC did not officially start the public comment period until December 31, 2002. The official comment draft differed slightly from the previous draft.

With the March 10, 2003 deadline rapidly approaching, a public hearing was conducted January 30, 2003 at the SCDHEC main office in Columbia to allow representatives of the regulated community to comment

for the record their concerns related to the general permit. Written comments were also collected at this time. Due to the unreasonableness of many of the requirements in the draft general permit along with its lack of consistency with the requirements stated in the December 1999 Federal Register, the comments in opposition to the permit were abundant, consistent, and justified. At the end of the public hearing SCDHEC representatives indicated that the comments would be taken into account and that a revised general permit would be issued the following Friday, February 7, 2003. However, on Monday, February 10, SCDHEC instead issued a memorandum stating that, due to a ruling in the US Ninth Circuit Court of Appeals, SCDHEC would not be issuing a state general permit before the March 10, 2003 deadline. Instead, SCDHEC required all designated entities to apply for individual phase II permits by March 10, 2003.

The City of Charleston was designated in Appendix 6 of the 1999 Federal Register, and therefore, was required toapply for permit coverage from SCDHEC **by March 10, 2003**. According to the federal guidelines, an individual permit requires a system map indicating the location of all outfalls and the names and locations of all waters of the US that receive discharges from these outfalls with the application. SCDHEC indicated in the February 10th memorandum that,

> "The Department recognizes that some MS4s may not have this map by March 10, 2003. If this is your situation, you should submit the portion of the map that you have completed and provide a date for when the completed map will be submitted. The date to submit the complete map should be as soon as possible after March 10, 2003."

Although the complete implementation of the rest of the storm water management program will not be required for a number of years after submittal of the permit application, it is prudent to begin formulating a program for budgetary and resource planning reasons.

3.0 Components of the NPDES Phase II Program

The City of Charleston, which is an owner/operator of a small MS4, will be required to reduce the discharge of pollutants to waters of the State and the United States to the "maximum extent practicable" to protect water quality. At a minimum, the City will be required to implement a Storm Water Management Program that addresses the following issues:

- Specify Best Management Practices (BMPs) for six minimum control measures and implement them to the "maximum extent practicable",
- Identify measurable goals for these control measures,
- Develop an implementation schedule for these control measures or frequency of activities, and
- Define the responsible entity to implement these control measures.

In order to meet these requirements, an inventory of the current City programs related to storm water issues was instigated. Representatives of Woolpert LLP conducted interviews with various members of the City staff that deal directly and indirectly with storm water issues. Staff members whose position or department could play a major role in helping to meet permitting requirements were also consulted. Representatives from the following areas or departments were consulted: Storm Water Maintenance, Construction Plan Review (subdivisions), Community Rating System (CRS), Fleet Maintenance, Environmental Services, Parks, Engineering Inspections, Charleston Fire Department, and the Building Official. In addition, an interview was held with members of the City of Charleston Commissioners of Public Works (CPW), and phone interviews were conducted with the environmental educators for both the Parks and Recreation Department, GIS, and Planning and Zoning. (See the attached Appendix for a complete list of individual staff members who contributed information to this report)

Using information from these interviews and from numerous resources provided by these individuals, the following narrative was developed and includes: a description of the six minimum control measures, the performance requirements for each, the current relevant City activities, and an action plan to meet conformance requirements for each minimum measure. Recommendations for ordinance revisions and the audit of the existing City code as it relates to various minimum measures is located in Section 4.0, Legal Authority.

3.1 Public Education and Outreach (Minimum Measure #1)

Implementing and managing an effective storm water program begins with community involvement. Greater support of the program is typically achieved as the public gains an understanding of the reasons why it is necessary and important. Public understanding and support are also beneficial when municipalities attempt to institute new funding initiatives or when recruiting volunteers. In addition, greater compliance with program requirements is experienced as the awareness of personal responsibilities and their impact toward protecting and maintaining the quality of area waters is achieved.

3.1.1 Requirements

To satisfy this control measure, the City of Charleston must implement a public education program to educate the public regarding the importance of proper storm water management. At a minimum, the City must perform the following tasks:

- Implement a public education program to distribute educational materials to the community or conduct equivalent outreach activities to communicate the impacts of storm water discharges on local water bodies. In addition, this program must address steps that can be taken to reduce storm water pollution; and
- Determine appropriate best management practices and measurable goals toward developing a public education and outreach program.

Examples of public education and outreach measures are abundant such as:

- Brochures or fact sheets
- Recreational guides for area waterways
- Educational materials library
- Low impact development initiatives
- Public education task force
- School programs
- An infomercial or public service announcement
- Waterway signage

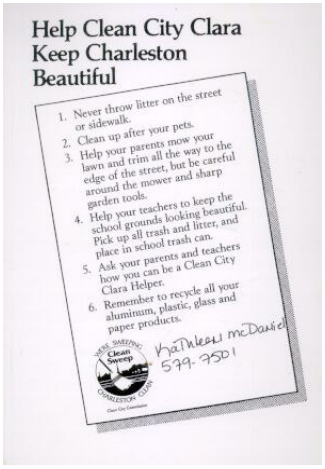
These materials, which should be tailored toward relevant local situations and issues, should involve a variety of strategies to ensure maximum coverage.

3.1.2 Current Activities and Resources

The City of Charleston employs two environmental educators assigned to two different City departments: Parks and Recreation. The primary focus of the Clean City Coordinator for the Parks department is for litter prevention efforts for the general public through distribution of educational materials or numerous involvement initiatives; the Clean City Coordinator also serves as a code enforcement officer. The focus of the Environmental Education division of the Recreation department is on providing hands-on environmental programs devoted to school children. The majority of the materials and programs listed below and in Section 3.2.2, Public Participation and Involvement, Current Activities and Resources are administered by these educators.

Clean City Commission

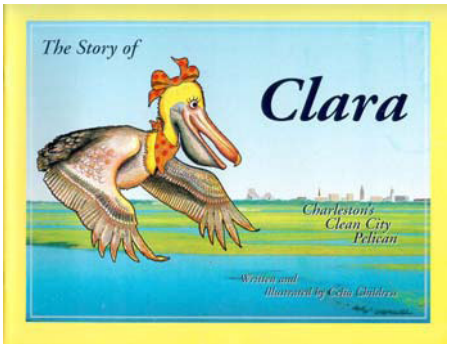
The Clean City Commission (CCC) was created approximately 25 years ago as is housed within the City Department of Parks. The CCC is made up of a selection of ten to fifteen citizens, neighborhood, and business leaders. The commissioners oversee CCC programs administered by the Parks environmental educator/CCC coordinator and determine where to allocate financial resources. The CCC is responsible for many of the environmental education programs that are mentioned below.



Clean City Clara Flier

Youth Education Program

The CCC has developed a youth education program with a mascot/character for school children called **Clean City Clara**. Clara is typically a citizen volunteer or in some instances a member of the Charleston Southern University women's basketball team, who dresses in a pelican costume to educate children on the advantages of litter prevention. Each year, Clara visits at least 20 area schools meeting more than 1000 school children. In addition



Clean City Clara Book

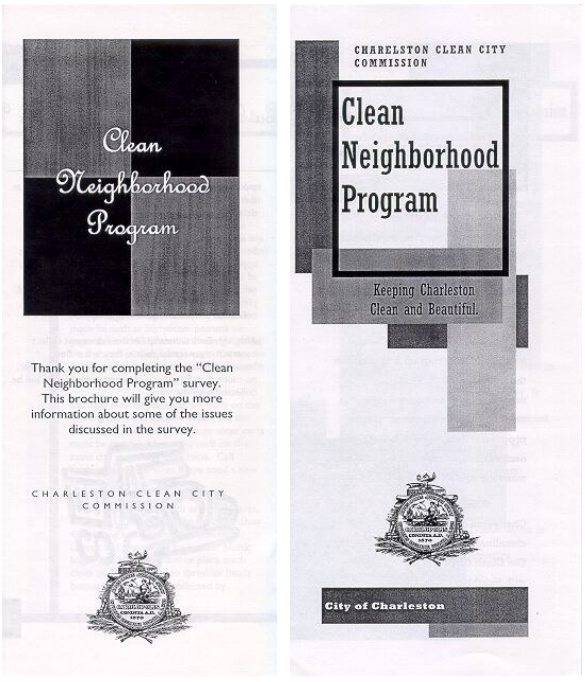
to a presentation by Clara, the character provides the teacher with a copy of her book, The Story of Clara. The book discusses the life of Clara and her work to help clean-up Charleston area rivers and harbors. The Commission has also developed a coloring book for distribution to further reinforce litter prevention efforts.

Neighborhood Councils

In 1977, the City of Charleston established the Citizen Participation Plan that provided a means for a neighborhood organization to be formally recognized by City government. After meeting criteria laid out in the Citizen Participation Plan, neighborhoods have the opportunity to achieve Neighborhood Council status. This status provides an open line of communication with the City to ensure that neighborhood concerns reach appropriate City officials and the City can distribute information to citizens accurately and rapidly. Neighborhood Council status is granted by the Neighborhood Commission, which consists of twelve citizens appointed by City Council. Each of the twelve members of the Neighborhood Commission represents various districts throughout the City. During the Great American Cleanup, 12 of the 86 recognized Neighborhood Councils held clean up projects (see Section 3.2.2). The currently 93 Councils in the City of Charleston provide an effective means for distribution of environmentally related educational materials as utilized by the Clean Neighborhood Program discussed below:

Clean Neighborhood Program

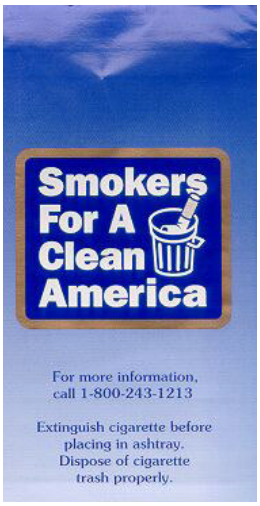
One of the CCC programs, the Clean Neighborhood Program, uses the referenced Neighborhood councils as a means to disseminate various types of environmental related information. Typical information that has been distributed to these neighborhoods has included information on highway litter, neighborhood beautification, debris from new home construction, and pet waste. The Clean Neighborhood Program has developed and distributed over 1000 copies of fliers devoted to the proper disposal of household garbage and trash. The Program also developed a detailed Neighborhood Survey to prioritize needs as categorized by Charleston area homeowners.



Clean Neighborhood Fliers

Cigarette Butt Campaign

The CCC has recently developed a cigarette butt campaign for litter prevention purposes. The City is distributing free RJ Reynolds pocket ashtrays and giving away free matchbooks at local gas stations with messages inscribed on the side of them such as "don't litter". Additional proposed activities include passing out brochures at the time of purchase and encouraging City employees to abide by litter prevention rules. The City has developed measurable goals for the program such as reducing litter in two public areas by 50% and distributing litter prevention literature to 3000 Charleston citizens over the next calendar year.



Pocket Ashtray

Gardening Programs

The environmental educator within the Recreation department has developed a gardening educational program that has been administered on selected Saturdays for the general public. The program focuses primarily on soils and fertilization, with some mention of proper application of pesticides.

31.3 Action Plan Recommendations

The City of Charleston must develop a comprehensive public education program to inform the community about the impacts of storm water discharges on local waterbodies. The primary issue that must be addressed for compliance with this measure is the subject matter of currently available educational materials related to storm water. The City provides various existing educational materials devoted to litter prevention through the CCC Youth Education, Cigarette Butt Campaign, and Clean Neighborhood Programs. However, litter and the potential for floatables are only one small component of NPS runoff.

NPS runoff was the catalyst behind the NPDES Phase II regulations and should be addressed through public educational materials accordingly. Many of the constituents in NPS runoff can be attributed to urbanization and the individual homeowner. Unfortunately, most homeowners are unaware of how their daily actions can potentially affect water quality in the neighborhood detention pond and ultimately Charleston Harbor. Using the City environmental educators, the City should develop target audiences, collect and evaluate existing programs, material, and resources, and distribute appropriate materials.

Identify Target Audiences/Pollutants

Prior to distributing public educational materials within the community, the City should attempt to develop target audiences with literature devoted to appropriate potential pollution sources. This could include literature tailored to entities known for specific storm water impacts such as below:

Entity		Potential Contaminants
Business	Laundromats/commercial car washes	Chlorine, Surfactants
	Restaurants	Grease
	Auto Garage	Petroleum Products
	Industry	Metals
Homeowner	Gardening/Landscaping	PHFs
	Automobile Maintenance	Petroleum Products

For example, water quality information could be developed for restaurants explaining the effects of dumping grease traps into storm drains or for auto garages that identifies the affects of improper disposal of used oil or anti-freeze. The City should also investigate including information on PHF contamination into the existing Gardening Program. Another potential target audience could be residents living on the peninsula, versus others in the community.

Research Existing Educational Materials/Programs

Literature and programs devoted to NPS pollution have begun to be developed over the last decade. To avoid duplicating efforts the City should research existing available literature and programs. There are numerous agencies with potential sources of information available on NPS pollution that could be utilized by the City. The SCDHEC Bureau of Water located at www.scdhec.net/water maintains an Outreach and Education link to various non-point source resources and publications. Various programs are sponsored by SCDHEC including the South Carolina Water Watch Program and the Champions of the Environment to involve citizens in cleaning up surface waters (See Section 3.2.3 for further discussion of these involvement programs).

The City should also research additional information available through the Clemson Extension Service. The Extension Service provides numerous water quality resources under a link on their web site entitled Educational Programs, Aids, and Publications. The SCDNR also maintains a web page located at www.dnr.state.sc.us/etc/education.html that contains useful educational material and links to other sites.

In addition resources from local agencies, numerous NPDES Phase I communities across the country have developed extensive web sites devoted to storm water. The City may find existing suitable educational materials under one of the following municipal storm water links:

Sammy Salmon

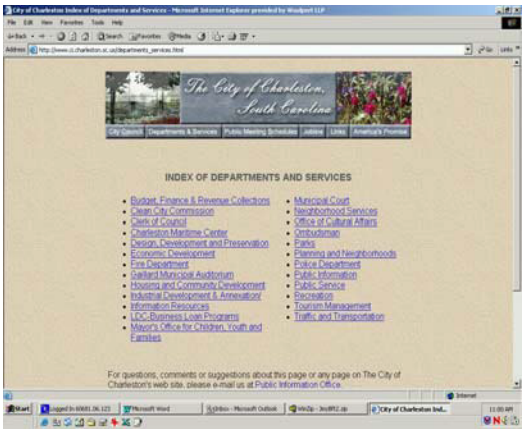
- http://www.sacstormwater.org/
- http://www.dfwstormwater.com
- http://www.ci.greensboro.nc.us/stormwater/
- http://www.dot.ca.gov/hq/env/stormwater/index.htm
- http://www.trinity-trudy.org/index.htm

Some communities have even developed mascots, similar to Clean City Clara, to promote water quality efforts such as Sammy Salmon, created by the City of Sacramento. Sammy has his own television and radio spots, as well as coloring books for kids. The City could investigate using Clara as the spokesperson for NPS pollution, in addition to her current role in litter prevention efforts.

Distribute Materials Using Existing Communications Mediums

The permit requirements are written vaguely, so that the City can implement public educational strategies deemed most appropriate and effective for their individual needs. The most efficient choice for implementation of NPS runoff educational materials is through existing communications mediums such as:

- Direct Mailings w/utility bill
- Post and Courier
- Local Infomercial
- City Home Page
- Neighborhood Newsletters
- Fliers for various City festivals



City Home Page

The City could develop handouts for individual homeowners and businesses to accompany a monthly utility bill. This would greatly reduce costs incurred for separate City wide mailings. The City could develop a short infomercial for public access television or educational material suitable for the Post and

Courier. Although not all residents have Internet access, the City could investigate uploading educational materials to selected areas of the City of Charleston website or developing a storm water home page like the examples shown in the previous section. Currently, both the Parks and Recreation department portions of the website have contact information available only.

Neighborhood newsletters or pamphlets such as those previously distributed by the Clean Neighborhood Program (see Section 3.1.2) could be distributed through the existing Neighborhood Councils. Fliers or pamphlets should also be available for distribution at the various environmental fairs and clean-up events discussed in Section 3.2.2. Finally, the City should investigate potential interlocal agreements with Charleston County or the City of North Charleston to minimize both costs and resources.

Carolina Clear Educational Initiative

The Clemson University Cooperative Extension Service, has developed a program called "Carolina Clear" that will effectively address both the Public Education and Outreach, and Public Participation and Involvement minimum measures in their entirety. These requirements would be addressed through a range of programs that could provide complete NPDES compliance for the City of Charleston. The intergovernmental agreement with the Clemson Extension Service would include a five-phased effort with various contribution levels offering different levels of service. SCDHEC has endorsed the program and encourages use by municipalities and local governments.

Costs have not been finalized, but representatives of Woolpert recommend that the City of Charleston *does not* use this program. The communities who are proposing to use this service do not employ a staff environmental educator and do not have existing resources and environmental programs in place. It would likely be much more cost effective for the City to distribute NPS educational materials and add NPS water quality components to the existing environmental programs through the two environmental educators.

Utilize Existing Environmental Educators

The City may wish to evaluate the roles/responsibilities of both City environmental educators and determine their effectiveness, but it appears that there is no duplication of efforts from the two educators. The existing programs administered by the environmental educators are excellent educational tools,

which target different types of audiences. The City should continue to support and promote both the Youth Education and Clean Neighborhood Programs and attempt to get more of the existing Neighborhood Councils involved in the Great American Cleanup. The City should also conduct another homeowner survey through the Clean Neighborhood Program to evaluate the overall community understanding of NPS pollution. This would be a great tool for identifying weaknesses and to help guide the development of proposed education initiatives.

To fully utilize its existing resources/educators, the City should allow the two educators to guide all of the initiatives for this minimum measure. This would utilize their experience with development of similar programs and likely minimize potential pitfalls. This would likely provide the most efficient overall public education program. Water quality educational materials could be selected and distributed in many of the media sources mentioned previously and included in various capacities within the existing litter prevention and ecology programs (see Section 3.2.2 for a summary of the existing ecology programs).

32 Public Participation and Involvement (Minimum Measure #2)

EPA believes that the public can provide valuable input and assistance in implementing a Phase II community storm water management program. As a result, the SC General Permit will require the City of Charleston to encourage public participation and involvement in the storm water program. The public is to be given opportunities to play a substantial role in both the creation and implementation of the management program. Using the public to help develop the program will broaden public support, increase the number of potential ideas to meet the permitting requirements, and shorten the implementation schedules by obtaining public comment early in the development of the program.

321 Requirements

At a minimum, the City will be required to determine appropriate best management practices and measurable goals toward encouraging public participation and involvement. Examples of potential opportunities for public participation and avenues for involvement are abundant such as:

- Public meetings or citizen panels to guide participation programs
- Volunteer periodic visual observations of water quality or citizen watch groups
- Storm drain stenciling programs
- Community clean-ups
- Adopt-A-Stream or watershed protection programs
- Earthday related activities
- Use of interactive or permanent installation of watershed diorama
- Method for citizen complaint system or hotline

322 Current Activities and Resources

Pet Waste Program

The CCC has developed a pet waste program entitled the "Pick Up After Your Pet" program. The intent of the program is to keep the city clean and reduce water quality problems associated with animal waste in parks and other public areas. In conjunction with the Parks department, the CCC has currently installed twenty-one plastic bag dispensers in nine public parks

Pet Waste Dispenser in Public Park

to encourage owners to clean-up after pets. Direct mailings have also been developed and distributed that quote the City pet waste removal ordinance and indicate potential fines for lack of compliance. Although many area residents are aware of, and abide by the ordinances, the CCC has identified college students as a target group for further education efforts. The CCC is working with the College of Charleston to distribute 1500 information packets at freshman orientation sessions. The Commission is also working with five local veterinarians and two pet stores to distribute educational materials. Finally, the CCC has developed small signs that state "clean up after your pet", which citizens can purchase for placement in their respective yard or neighborhood. The City has developed a goal of having methods in place for 75% of dog walkers to have means of disposing of their animal waste.

Pet Waste Flier

Great American Clean-up

The CCC also sponsors several Charleston area events such as the Great American Cleanup, a three-month nationwide litter prevention initiative. Coordinated by 12 representatives of the Americorps, the 2002 one week event in Charleston included 3168 participants from neighborhoods, schools, government groups, community service organizations, and more than 600 cadets from the Citadel Military College. It was estimated that the event successfully removed approximately 217,680 pounds of litter from the streets and residential areas of Charleston. This year the Great American Cleanup took place from April 7-12th.

Great American Cleanup Picture

Rivers Clean Sweep Challenge

The CCC also sponsored another event during the Great American Cleanup, called the Rivers Clean Sweep Challenge. This event was originally developed by the Rivers Foundation of Charleston to encourage beautification efforts by Charleston area college students. The now annual 5th Rivers Clean Sweep Challenge on March 23, 2002, included over 600 students from the College of Charleston, the

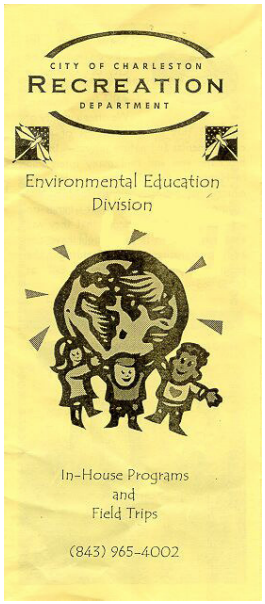
Citadel, Charleston Southern University, Johnson and Wales University, and Trident Technical College. Approximately 3000 pounds of litter were collected in less than 3 hours during last year's event. In the past, scholarship money has been given to the university or college who collected the greatest amount of debris. The 2003 Rivers Clean Sweep Challenge will took place on February 22, 2003.

Environmental Education Fair

In partnership with the coordinator of the CCC , the environmental educator from the Recreation department has developed an environmental education fair entitled "Spring into the Outdoors". The fair will include educational materials related to various aspects of environmental education and awareness.

Ecology Programs

Each of the following ecology programs have been developed and administered by the environmental educator of the Recreation department. Each of the programs provides hands-on environmental awareness activities for school children with focus on a particular ecosystem. Teachers typically receive a comprehensive brochure explaining each available program. The teachers then request an appropriate program to be administered by the recreation department staff members. Although each program requires a fee, the small fees are used as a supplement to the Recreation department budget only. In addition, to the programs listed below, the Recreation department is working on additional programs related to forestry, conservation, and ecology within one particular City park that provides a brackish water marine habitat.



Ecology Program Brochure

Marine Ecology Program

This program takes place at the Brittle Bank Park on the Ashley River. The program provides children with three educational stations tailored to specific aspects of a salt marsh ecosystem. Topics for discussion include the functionality of the salt marsh, why it is important, and the role of the marsh and its associated vegetation in the filtering of potential contaminants.

Wetland Ecology Program

The wetland ecology program entitled Wild Wetlands takes place at Johns Island Park. This program focuses on the functions of wetlands and the habitat they provide. Stations for this program include using

dip nets to look at aquatic organisms, a walk thru and wetland forest discussion, and a look at various live reptiles owned and cared for by members of the Recreation environmental education division.

Ocean Ecology Program

The program devoted to ocean ecology is given on the beach at Sullivan's Island. The program includes discussions of sea turtles, barrier islands/sand dunes, and the fishing and crabbing industries. Much of the discussion is focused on how each of these subjects is affected by the residents of Charleston and how they support the local community.

3.2.3 Action Plan Recommendations

Due to the similarities or crossover between Public Education and Outreach, and Public Participation and Involvement, portions of the recommendations in the previous section apply to this minimum measure. Target audiences and potential contaminants can be used to guide appropriate public involvement activities. Research for existing NPS educational materials will also yield numerous types of existing interactive programs. Since there are numerous programs already available, these programs should be fully evaluated before implementing any new City initiatives to achieve NPDES compliance.

Research Existing School Programs

The following programs are designed primarily for school aged children or for use within the classroom. These programs could provide great educational opportunities for children to learn about water quality. Many of these programs or program information can be obtained for little or no cost and offer more than just a basic understanding of the subject. These programs could also be potentially implemented along with some of the existing ecology programs discussed in Section 3.2.2, administered by the Recreation environmental educator.

Teaching KATE (Kids About The Environment)

Run by the Coalition for Natural Resource Education, which is composed of various South Carolina state agencies and private organizations, this program offers environmental education programs for grades 3-8 as well as resources and instruction for teachers. www.teachingkate.org

South Carolina Water Watch Program

This program, run by the SCDHEC Bureau of Water, involves the public and local communities in water quality protection, and encourages South Carolina's citizens to become stewards of the State's lakes, rivers, streams, and wetlands. To date, a large number of the participating groups are schools.
www.scdhec.net/water/html/wtrwatch.html

Champions of the Environment

Also run by the SCDHEC Bureau of Water, this program has two major components that encourage young people to become more environmentally conscious. First, the program awards grants on a monthly basis to South Carolina's K-12 students and teachers to promote environmental education activities. Second, South Carolina's 6-8 grade students can demonstrate their environmental knowledge during the annual South Carolina Environmental Awareness Competition. The City could sponsor a poster contest with the winner being entered into the State competition and getting his/her poster used as a downtown banner.
www.scdhec.net/water/html/champion.html

Action for a Cleaner Tomorrow

Operated by the SCDHEC Bureau of Land and Waste Management, this program is "an activity-based, interdisciplinary curriculum supplement that can serve as a starting place for incorporating basic environmental education in the classroom." It was developed by South Carolina teachers, is designed for grades K-12, has been correlated to the South Carolina

curriculum science standards, and has won several national awards. www.scdhec.net/recycle/html/action.html

Project WET

The goal of Project WET is "to facilitate and promote awareness, appreciation, knowledge, and stewardship of water resources through the development and dissemination of classroom-ready teaching aids and through the establishment of state and internationally sponsored Project WET programs." Although it is a national program, Project WET facilitators can be located throughout the state. www.dnr.state.sc.us/lwc/projwet/scwet.html

Research Existing Community Clean-up Events

Although the City is currently involved in the Great American Clean-up and River Sweep activities, the City could investigate additional activities that will protect or rehabilitate local waterways and drainage areas. These events would primarily focus on litter prevention rather than NPS pollution, but would continue efforts to clean-up Charleston Harbor. The City could add a public education component to any of these events using NPS educational materials discussed in Section 3.1.3 or the existing pet waste educational materials developed by the Parks department. This type of combined effort could help meet both public education and public involvement requirements. Existing community involvement programs, most of which are administered by the DNR, include:

Adopt-a-Stream

Many communities oversee a program that allows civic groups, neighborhoods, school classes, and others an opportunity to become active participants in the health of their local waterways. Similar to the "Adopt-a-Highway" programs, volunteers select a water body and pledge to keep it clean. Usually, the group is given recognition for its efforts on signs at bridge crossings or in bulletins and newsletters.

Adopt-a-Watershed

This organization seeks to "enhance K-12 science education and encourage watershed stewardship." Using a local watershed such as a living laboratory, students could engage in hands-on activities, making science applicable and relevant to their lives. It weaves education with the community by developing collaborative partnerships and

reinforcing learning through community service. Per the SCDHEC Monitoring Stations map located in the Appendix, the City could tailor remediation activities in the watershed based on known impairments such as dissolved oxygen in the Stono River.
www.adopt-a-watershed.org

Adopt-a-Landing

Run by the SCDNR, this program is designed to clean up and promote the stewardship of boat ramps along SC rivers and lakes. It also serves to educate the public on the harmful effects of litter on the environment. Participation is open to any community or civic organizations, businesses, individuals, and government organizations. This program could be implemented by the City on a particular boat ramp on the outskirts of the City.
www.dnr.state.sc.us/water/envaff/river/educate/aalandng.html

Beach Sweep

Headed by the SCDNR, this program is an annual cleanup of SC waterways that is likely more appropriate for residents of the City of Charleston. Participants can see first-hand the hazards of aquatic debris, the effects it has on area beaches and waterways, and the threat it poses to local wildlife. The City could investigate partnership with Charleston County, which is already actively involved in the Beach Sweep program.
www.dnr.state.sc.us/water/envaff/river/educate/rivedu.html

Research Existing Civic Environmental Programs

Several youth organizations offer programs that place an emphasis on environmental issues, some specifically with water quality. The City should encourage the local chapters of these organizations to become active in these types of programs. The City could investigate some form of recognition from Public Service or from one of the environmental educators for members of Boy or Girl Scouts who earn one of the following badges:

Soil and Water Conservation Merit Badge

Offered in the Boy Scouts of America merit badge program, this badge helps young men understand the importance of water and soil conservation practices. It

also requires that the badge candidate become involved by conducting a project to help recover or preserve an area whose soil or water is deemed sensitive. www.meritbadge.com/bsa/mb/106.htm

Water Drop Patch

This project was developed jointly by the United States EPA and the Girl Scout Council of the Nation's Capital (GSCNC). It encourages young women to "make a difference in their communities by becoming watershed and wetlands stewards." The program allows girls use their skills and knowledge to educate others in their community about the need to protect the nation's valuable water resources. www.epa.gov/adopt/patch/

Develop Storm Drain Stenciling Program

Although the City of Charleston separated its previously combined sewer system in 1966, many people are unaware that the storm and sanitary networks are separate systems. Many citizens believe that this combined system is ultimately treated at the Plum or Daniel Island wastewater treatment plant prior to discharge to receiving waters. Therefore, residents commonly dump contaminants such as used motor oil and anti-freeze into neighborhood storm drains. Storm drain stenciling has become a popular way to inform the community of where the storm sewer ultimately discharges and to discourage people from disposing of contaminants improperly. Although some citizens are indifferent or believe that their actions have no affect on area waterbodies, many citizens will refrain from improper disposal techniques if educated properly. Educated citizens are typically much more likely to refrain from dumping hazardous materials into the storm sewer system than uneducated ones.

Stenciling is the most common method for labeling storm drains, but some communities have developed and installed plastic plates that can be glued to drainage structures. The City should pursue this effort for its entire jurisdictional limits. Efforts should be made to get volunteers from the community involved in the stenciling. Storm drains could be stenciled with various messages such as "Drains to Cooper River" or "No Dumping, Drains to Church Creek". The City could promote annual one-day stenciling efforts during the Great American Clean-up or other City clean-up events. Due to the size of the City of Charleston, the effort could target

Stenciling Example

different watersheds each year. The peninsula should receive priority for these initiatives to help ensure that the constant flow of tourists in downtown Charleston is made aware of the MS4. Other additional educational materials and programs can and will focus on Charleston residents only.

Cast Manhole Covers

Although the following approach may be more related to public education than involvement, numerous foundry companies have developed another technique similar to stenciling. These companies have begun customizing manhole covers for many NPDES Phase I and Phase II communities. A representative from Storm Water Maintenance indicated that such covers have been discussed within the department. Manhole covers could be cast with the City of Charleston logo and could read "Sanitary Sewer" or "Storm Sewer" to differentiate between the two systems. The City could choose to retrofit existing manhole covers with a new customized cover or could mandate that all new development be required to adhere to these standards. Many foundries will offer customized covers for the same price as standard covers, if a community requires them as part of its standard specifications. Although this effort may help storm and sanitary sewer maintenance crews, it may not provide the same water quality benefits as stenciling or medallions located at each storm inlet.

Collect Household Hazardous Materials

York County Haz-Mat Flyer

Although hazardous materials collection is a beneficial initiative in itself, the implementation of storm drain stenciling makes this a necessity. After learning that the City maintains a MS4, residents need either a permanent collection facility or a collection day to dispose of hazardous materials such as pesticides, paint, antifreeze, and bleach. Many local auto-parts stores or garages accept automobile related fluids such as used oil and anti-freeze, but some residents may be more receptive to a City outreach effort. Hazardous waste collection days or facilities could be developed by the City, but must be well publicized with billboards, flyers, newspaper articles, TV advertising, and/or radio spots. Other municipalities and local governments such as Spartanburg and York County are currently conducting similar hazardous waste collection days. Improper disposal of hazardous materials is considered an illicit discharge which indicates that collection of these materials can also be considered a BMP to meet the requirements for Illicit Discharge Detection and Elimination.

Utilize Environmental Educators

Continue to Support Existing Programs

The existing pet waste program administered by the Parks environmental educator is an excellent program to promote both cleanliness and sanitation. To meet public education requirements, the City should develop educational materials that further explain why pet waste is harmful from a water quality standpoint. This could include a basic lesson of surface water runoff and the potential transport of harmful pathogens contained in pet waste. It should be pointed out that this type of contamination can ultimately lead to alga blooms, beach closings, and threats to public health.

The City should also continue to support the existing ecology programs, but look for ways to incorporate additional information concerning NPS pollution. The ecology program devoted to marshlands and wetlands are excellent means to discuss filtering of those contaminants that are not prevented by source controls. The success of the Great American Cleanup is also extremely commendable and should continue to be promoted on annual basis. The upcoming City of Charleston Environmental Education Fair, "Spring into the Outdoors", may be the best event to retrofit with NPS educational components. The March 2003 Fair is the first such environmental fair, so it may be easier to incorporate this type of water quality curriculum into the new program. This component could be developed for the event next year assuming the fair is a success. The ecology programs and the "Spring into the Outdoors" event may also be great opportunities to purchase and utilize a watershed diorama.

Storm Water Diorama

Select & Implement New Programs

Similar to Public Education activities, the City should use both environmental educators to recommend and administer new Public Involvement initiatives. The educators should evaluate the existing school programs, community clean-up events, and civic programs in Section 3.2.2. The educators should also evaluate the feasibility of implementing a storm drain stenciling program and a household hazardous materials collection program.

Implement Public Notice Procedures

The Freedom of Information (FOI) Act outlines public notice procedures and requirements for all divisions of government. The City should continue to ensure that the public is given proper notice and access to any public meetings.

3.3 Illicit Discharge Detection and Elimination (Minimum Measure #3)

To eliminate illicit discharges into the storm sewer system, the City of Charleston will be required to develop a strategy to detect and eliminate such discharges. An illicit discharge has been defined by the EPA as "any discharge into a separate storm sewer system that is not composed entirely of storm water". Typically, illicit discharges enter a storm sewer system either through direct connections, e.g., sanitary sewer piping, or indirectly from cracked sanitary sewer conveyance systems, spills collected by storm drains, or from contaminants dumped directly into a sewer inlet. The following are typical examples of illicit discharges:

- Sanitary wastewater
- Effluent from septic tanks
- Laundry wastewater
- Commercial car wash discharges
- Improper disposal of household or automotive chemicals/fluids
- Spills resulting from roadway accidents

Pollutants from these sources can include heavy metals, toxics, oils and grease, solvents, nutrients, viruses, and harmful bacteria. Substantial levels of these contaminants can damage fish and wildlife habitats, decrease aesthetic value, and more importantly, threaten public health due to contaminated food and drinking water supplies.

3.3.1 Requirements

To comply with NPDES Phase II program requirements, the City will be required to address the following requirements:

- Develop a storm sewer map illustrating the location of all storm sewer outfalls and the names and location of all waters of the United States that receive discharges from these outfalls.
- Prohibit the discharge of non-storm water discharges into the City storm sewer system through the implementation of an ordinance or other regulatory mechanism.
- Develop a plan to detect and address non-storm water discharges, including illegal dumping.
- Educate public employees, businesses, and the general public regarding the impacts associated with illegal discharges and the improper disposal of waste

3.3.2 Current Activities and Resources

Outfall Inventory

An inventory of outfalls is an integral part of this minimum measure in order to gain complete awareness of the City discharge points. The City must develop mapping that illustrates the location of all storm sewer outfalls and the names and location of all waters of the United States that receive discharges from those outfalls. EPA defines an outfall as "a point source at the point where a municipal separate storm sewer discharges to waters of the United States". Although not clearly defined by SCDHEC, these waters of the United States generally include any waterway that is identified on a USGS 7.5' topographic quadrangle map.

In 1984, the City of Charleston retained an engineering consultant to perform a system-wide storm sewer inventory within the City jurisdictional limits. Entitled the Master Drainage and Floodplain Management Plan, the study included an inventory of all existing drainage facilities (pipes > 24 inches) in 182 distinct drainage areas, hydraulic analysis of the each system, and recommended improvements with planning level costs. Although the methodologies used in the hydraulic analysis are somewhat outdated, the existing inventory portion of the report will be very helpful in the development of a current outfall inventory. Excluding portions of the City which have been annexed since the '84 study and any outfalls from new construction, the City already has the mapping of the majority of its outfalls.

Illicit Discharge Consent Order

The SCDHEC conducted sampling of discharges in the City of Charleston storm sewers between November 1988 – February 1989. The investigation revealed fecal coliform counts which the consent order stated "…may be of human origin, thus possibly indicating unauthorized discharges…". The document ordered that the City of Charleston develop both a methodology for investigation and plan for elimination of the suspected illicit discharges by March 1992. After approval of the remediation plan, the City was to begin the investigation for the New Market Creek outfalls/sub-watershed (the term outfall is used in the consent order for the drainage network/sub-watershed that discharges from a particular outfall). Upon the conclusion of the analysis of these outfalls, the City and SCDHEC were to prioritize the next outfalls for investigation.

The City originally divided the peninsula into approximately 51 outfalls/sub-watersheds and has currently completed an illicit discharge investigation for three total basins. This includes the original study of the

New Market Creek basin, along with more recent studies of the King and Market Street outfalls. Each study adhered to a detailed protocol as follows:

1) Six grab samples over three days to determine initial fecal coliform concentrations
2) Visual inspections and inventory of each manhole/catch basin in the sub-watershed
3) Smoke testing of the network for detection from sewer vent stacks
4) Subsequent dye testing from properties with positive smoke tests
5) System repairs and confirmation dye testing
6) Follow-up fecal coliform concentration testing

The first study of the New Market Creek basin was delineated separately from the watersheds contained in Master Drainage and Floodplain Management Plan (the Plan). The large approximately 475 acre basin was studied from 1992-1998 and included portions of various outfalls identified in the Plan including: Huger Street, Meeting Street North, Runey Street, Grove Street, Jackson Street, Cooper Street, Morrison Drive North, and Peachtree Street. Overall, the study produced positive results. A total of 101 positive smoke test locations were identified in the study, but 31 were confirmed with positive dye tests. Eight of the positive dye tests were fixed by CPW, while individual homeowners addressed the remaining positive test locations. Although initial fecal coliform counts were measured at greater than 240,000 MPN/100mL, the corrections in the watershed lowered fecal levels to greater than 1600MPN/100mL. The final fecal coliform concentrations were in excess of SCDHEC regulations, but SCDHEC allowed the City to proceed to the King Street basin. It was agreed that all efforts had been exhausted in the basin.

The outfall draining the approximately 31.5 acre King Street basin, as identified in the Plan, was selected for the next investigation. This study generated a total of 12 positive smoke test locations, but only 3 were confirmed with dye testing. A representative of the City has indicated that two of the cross connections have been repaired, but that the final location is awaiting attention by CPW. Although notified of the discharge in October 2001, CPW has blamed the delay on both employee turnover and subcontracting issues. In March 2003, a representative of CPW stated that a work order had been issued and that the discharge should be repaired soon. After CPW sliplines the lateral causing the third positive dye test, subsequent dye testing and lab analysis will be completed in accordance with the protocol outlined above. However, due to the small number of positive dye tests in the watershed, it is not suspected that follow-up fecal counts will demonstrate substantial improvement over initial testing ranging from 5000-50,000 MPN/mL.

The final and most recent basin report for the Market Street basin was completed and submitted to SCDHEC in October 2002. Unfortunately, the report states that only one cross connection was located and eliminated. Although smoke was observed during testing from 13 buildings/residences, subsequent dye testing produced only one positive cross connection. During dye testing, dye was not observed in the storm sewer and in some cases not observed in either the storm or sanitary sewer. The testing methods were therefore fairly inconclusive. In addition, fecal coliform testing after correction of the positively identified cross connection provided no improvement in fecal coliform concentrations during final lab analysis. Comments were received from SCDHEC on February 24, 2003.

The following table summarizes the current success as of March 2003 in eliminating cross connections to meet the illicit discharge consent order:

Outfall	Positive Smoke Tests	Positive Dye Test	Eliminated Cross Connection
New Market Creek	101	31	31
King Street	12	3	2
Market Street	13	1	1

In order to proceed with the consent order, the City submitted the fourth basin (Meeting Street) proposal prior to completion of the Market Street basin to SCDHEC in April 2002. The City has not received comments or feedback from SCDHEC on the proposed basin at this time. In response to receiving SCDHEC comments on the third basin report, the City submitted a proposal on March 21, 2003 for additional studies in the King and Market Street basins.

City of Charleston CPW

The City of Charleston CPW provides water to portions of Charleston, Berkeley, and Dorchester counties. Wastewater treatment is provided within the City of Charleston, the St. Andrews and James Island Public Service Districts, and to the towns of Folly Beach and Hollywood. The sanitary sewer network ultimately discharges into one of two plants located on Plum and Daniel Islands. Representatives of CPW stated that the group is very active in attempts to minimize any leaks and cross connections from their system.

CPW is ISO 14000 certified with a detailed protocol for its complaint/work order system. In addition, the construction department maintains three crews to handle repairs.

CPW began dye testing which includes the use of closed circuit television (CCTV) inspections on the peninsula approximately two years ago. . In the event that a cross connection to the storm sewer was discovered, the connection was fixed and new dye testing was performed to confirm that the pipe was indeed correctly connected to the sanitary system. CPW stated that 50% of the sanitary system was constructed with VCP, which has the potential for problems with structural integrity.. However, approximately 4% of the sanitary network has currently been sliplined to reduce the possibility for such problems. CPW also routinely lines the interior of masonry manholes with cementitious and epoxy coatings to reduce inflow and infiltration. Finally, representatives of CPW stated that they are currently discussing the feasibility of installing tide flex valves on the storm sewer system to subsequently keep backwater out of the sanitary sewer system.

Hazardous Materials

The Charleston Fire Department serves as the Hazardous Material (Haz-Mat) response team in charge of mitigation of potential contaminants during a spill. Members of the department attend containment training and are responsible for keeping the spilled material from spreading. Unfortunately, many spills are due to roadway accidents, which allows hazardous materials to flow directly into nearby storm drains/catch basins. The Haz-Mat team typically attempts to use dikes or other preventative methods to confine the spill before then contacting a private entity to clean-up, collect, and dispose of the material. Any sorbents or other contaminated containment devices are given to the private contractor for proper disposal. The response and containment process is outlined in a strict set of Standard Operating Procedures (SOPs) in the event of a spill.

Each and every hazardous response is reported to SCDHEC. In the event of a large spill, both SCDHEC and the Coast Guard are contacted for direction in the clean-up effort. The Charleston Fire Department has also done some preemptive work with two large industries, Allied Terminal and Rodeo; both located on the peninsula. The work included a walk-through of the plants to identify potential risks to the Haz-Mat team, as well as risks associated with potential contaminants. In addition, both industries maintain an outdoor nox box (information box) at each plant location. By accessing the boxes, the Haz-Mat team can obtain both site maps of the facility, and Material Safety Data Sheets (MSDSs) for chemicals used in plant processes.

3.3.3 Action Plan Recommendations

Outfall Inventory

The NPDES Phase II regulations do not define requirements for pipe sizes and ditches that must be included within the outfall inventory. However, the NPDES Phase I regulations state that all pipes 36 inches in diameter and greater or equivalent ditch (cross sectional area) are major outfalls. However, for conveyance structures that drain sub-watersheds containing industrial landuse, all pipes 12 inches and greater or equivalent ditches are considered major outfalls. Since the NPDES Phase I regulations for medium and large MS4s were intended to be more stringent than the Phase II requirements, Woolpert recommends that the City use this definition for completion of the outfall inventory. Although this approach is conservative, SCDHEC has proven to be unresponsive in defining details of the permit requirements.

It appears from the Master Drainage and Floodplain Management Plan ('84 inventory) that the storm sewer inventory was completed using traditional surveying techniques, which would provide confidence in the location accuracy of the system. However, per page 28 of the report the inventory included conduits and culverts "…24 inches in diameter and larger, including equivalent channels and ditches…". The report states that for smaller diameter portions of the system, less detailed observations were made to establish watershed boundaries only.

Peninsula

Since the peninsula is completely urbanized/developed, it is likely that the majority of discharge points in this area are from piped systems. Open channels or ditches would create numerous operation and maintenance burdens, as well as safety concerns in the downtown area. It is also likely that these discharge points are greater than 12 inches due to the excess of imperviousness and subsequent runoff. Since there is a lack of industrial areas on the peninsula, outfall inventory requirements for the peninsula would include 36 inch diameter pipes and larger. The peninsula was completely developed prior to development of the '84 inventory, so few new outfalls would be expected. The '84 inventory is likely a comprehensive inventory of major outfalls that could be regulated by SCDHEC under this minimum measure. Members of the City GIS division stated that a coverage of the outfalls on the peninsula based on the '84 inventory was created in order to address the previously discussed illicit discharge consent order.

Remaining City Limits

The outfall inventory for the remainder of the City limits will require additional work. The City should begin by researching the availability of the '84 inventory in a digital format for conversion to the City GIS. Representatives of the City have indicated that neither the City nor the consultant who performed the study has been able to produce the data previously. It was most likely created with an outdated version of AutoCAD, which would definitely create problems due to advances in technology. If indeed not available, the City should begin investigating digitization of the study. Due to the extents of the inventory, this would require many man-hours to complete, but would be an invaluable tool for the Engineering division. The City could begin by digitizing the outfalls only, but should investigate digitization of the entire system and recorded attributes at a later date. The City could also investigate digitization of outfalls contained on approved City construction plans. However, this would require a significant commitment of time/man-hours and may not provide a comprehensive end result.

Upon completion of the outfall digitization, the City should begin walking jurisdictional waters to both verify the inventory and to locate additional outfalls. Annexation and new construction since the '84 inventory for the remainder of the City limits (west of the Ashley River) have likely created numerous additional outfalls. The City should develop a plan to complete outfall inventory requirements by watershed and include the plan within the Storm Water Management Plan (SWMP). The City should also obtain and begin evaluating current available landuse. A representative of the GIS division has indicated that the City landuse coverage is approximately five to six years old. This coverage will be used to determine outfalls required for submittal to SCDHEC and should include coverage matching current City limits. Additional landuse delineation may required to identify industrial areas in newly developed or annexed areas.

Illicit Discharge Consent Order/City of Charleston CPW

Due to unavoidable crossover between the interests of these two entities in regard to prevention and elimination of illicit discharges, recommendations regarding them were combined for this section. Action plan items for this section were divided into four main recommendations:

- Request SCDHEC to repeal the illicit discharge consent order and replace it with the illicit discharge detection and elimination minimum measure of the MS4 NPDES permit
- Develop a focus group to identify important issues and potential solutions related to illicit discharges

- Revise and implement the basin studies on the peninsula taking the findings from the focus group into account
- Formalize communication procedures between the City, CPW, and SCDOT

It is unclear to representatives of Woolpert, why the Charleston CPW was not named along with the City in the illicit discharge consent order. Although the City is partially responsible for the conditions of and discharges from the storm sewer network, the primary source of the fecal coliform bacteria seems fairly obvious (see letter dated June 30, 2003 from CPW in Appendix for their comments). Due to the age of the existing CPW infrastructure and history as a previously combined sewer, cross connections and leaks are somewhat expected. In addition, much of both the storm and sanitary sewer network were built with vitrified clay pipe (VCP), which historically has problems with leaking, infiltration, and exfiltration. Sanitary sewer discharges could not enter the storm sewer network unless both separate systems were experiencing inflow and infiltration. In addition, if the source of the illicit discharge is due to a cross connection from a sanitary sewer lateral maintained by the CPW, the City should not be solely financially responsible for identifying the source of the discharge.

Likewise, the South Carolina Department of Transportation (SCDOT) should share some responsibility in the illicit discharge detection and elimination program in Charleston. The majority of the roads within the City limits are owned and maintained by SCDOT. As a rule, the storm drainage system associated with a road that is contained within the road right-of-way is owned and maintained by the owner of the road. Therefore, the majority of the storm drainage system in the City belongs to SCDOT. As evidence to this concept, when Charleston County connected the storm drainage system from the downtown County library into the drainage system under a SCDOT road, an encroachment permit was required by SCDOT, thereby establishing ownership and regulatory authority of the system.

In order to avoid repetitive requirements and to maintain a comprehensive storm water management program under NPDES Phase II, the City should seek to repeal the illicit discharge consent order. The City would continue to address cross connections on the peninsula and throughout City limits, but under the umbrella of the Illicit Discharge Detection and Elimination minimum measure requirements. This approach would give the City the option to expand the existing basin by basin illicit discharge detection analysis, to a comprehensive storm water management plan for each individual basin. This could include the addition of required dry weather screening for other parameters and verification of outfalls and attributes associated each outfall. Each basin study requires notification to homeowners and businesses of smoke testing and permission to perform dye testing. The City could investigate distribution of public

educational materials to these entities upon initiating each basin study, as part of the notification process. An overall watershed approach would likely prove to be cost effective.

The City of Charleston is unique from other municipalities statewide due to the age and history of its previously combined storm and sanitary sewer network. In addition, tidal influence, a high ground water table, and sedimentation within the storm sewer system make illicit discharge detection and elimination extremely difficult. Cross connections and sanitary sewer leaks are fairly common, but the City basin approach designed to meet the illicit discharge consent order has provided some positive results. Although dye testing within the New Market Creek watershed confirmed only 31% of the positive smoke test locations, the City achieved a 99% reduction in fecal coliform counts. The subsequent two studies were not quite as successful, but illicit discharges are being eliminated. The SCDHEC approved protocol for the basin studies appears to be utilizing the best available techniques to locate cross connections. However, Woolpert recommends that the City reevaluate the current protocol and integrate changes into the proposed work plan for additional study in the King Street and Market Street Drainage Basins. The City could solicit advice from other coastal communities with aging infrastructure such as Savannah, GA or New Orleans, LA, who may be experiencing similar problems.

If the City is going to be successful in getting the consent order repealed, a proposal for an alternative plan will have to be developed for submission to SCDHEC. We recommend an approach that not only appeases SCDHEC, but determines and addresses the issues related to illicit connections that concern the local interested groups including but limited to:

- Sierra Club
- South Carolina Phytoplankton Monitoring Network (SCPMN)
- Center for Coastal Environmental Health and Biomolecular Research (CCEHBR)
- South Carolina Coastal Conservation League Inc.
- The South Carolina State Ports Authority (SPA)
- SC Sea Grant Consortium
- SC Department of Natural Resources

We propose that a focus group be created with representatives from these and similar groups along with representatives from SCDHEC, City of Charleston, Charleston CPW, and SCDOT to go through a series of meetings. The meetings would be organized to educate these "stakeholders" of the issues currently facing the City with the consent order and the impending NPDES MS4 permit, explain the challenges of the current illicit tracking program, and solicit their concerns concerning water quality. Using the results

from this process combined with the institutional knowledge of the City gained from attempting to track illicit connections for the past eleven years, a program can be established that includes coordination and responsibility among SCDOT, CPW, and the City that better addresses the priorities of the stakeholders. Such a process would create a more efficient illicit tracking program that has "buy-in" by the stakeholders. This process would also meet the criteria of the public education and public involvement minimum measures.

One of the biggest current hurdles to addressing illicit connections within the City is separate ownership of the storm and sanitary sewer system by the City, SCDOT, and Charleston CPW. The City and CPW have worked together to resolve various issues, but should work to improve communications and cooperation between the two entities. To date, SCDOT has assumed no responsibility with the water quality aspect of the storm drainage system. Efforts should be made to include SCDOT in all future illicit discharge programs. All the entities are responsible for achieving the same goal, (reducing cross connections) but resources are not being shared and communication is inadequate. There are also many discrepancies between information compiled from the City and the interview conducted with representatives of CPW. Personnel from CPW stated that smoke and dye testing, and slip-lining had been completed for portions of the entire sanitary sewer system, but representatives of the City continue to find problems.

The most obvious example of such problems can be seen firsthand in each of the three basin reports. CPW did not indicate dates or timelines for previous completion of system-wide smoke or dye testing, but the number of positive smoke tests for the storm sewer system directly contradicts the information from CPW. Just recently during a renovation project of a historic home located on Tradd Street, it was determined that the sanitary sewer lateral was connected directly to an adjacent brick arch culvert. A representative of stormwater maintenance stated that CPW was usually pretty responsive when contacted for maintenance issues, but yet the cross connection identified in the King Street basin report in October 2001 has not been repaired. CPW also mentioned investigating installation of tide flex valves on City storm sewer outfalls to reduce infiltration into the sanitary sewer network. However, even if the storm sewer network was experiencing exfiltration problems, major sanitary sewer trunk lines should not receive additional inflow if properly slip-lined as CPW indicated.

The Market Street basin report included data from independent smoke testing by CPW of the sanitary sewer network in the Market Street area. The CPW study identified approximately nine locations in the area where smoke was observed discharging from the storm sewer. These locations or source of these

problems may or may not be the same as those independently discovered by the City when smoke testing the storm sewer. Although information from both of these studies is included in this report, it appears that the separate studies are not always properly cross referenced. In addition, neither entity notifies the other party when an illicit connection has been repaired. This could eliminate time and resources spent searching for a connection that in the meantime could have been fixed by the other party.

Both CPW and the City stated during interviews that better communication between the two would be beneficial. The City should simply take the initiative to open communication lines with CPW and establish detailed interactive reporting requirements. The City could further investigate collaborative efforts in attacking problems using the basin by basin approach with shared financial responsibility. The entities could also investigate a partnership for simultaneous system testing on both the storm and sanitary sewer systems to better pinpoint the location of illicits.

Dry Weather Screening

In order to detect and eliminate non-storm water discharges other than domestic wastewater, the City must develop a program and methodology for identification of these discharges. EPA has determined that after a 72-hour time period of no rainfall, any discharge from a municipal separate storm sewer may be non-storm water related (excluding permanent backwater from tides). Therefore, unless the discharge is exempt from the regulation such as irrigation water, water line flushing, or residential car washing, the discharge is considered an illicit. In order to determine the source of the discharge, some form of grab sampling must be performed during dry weather conditions. Regulated entities are then required to analyze the constituents in the sample in order to determine the source of the discharge and to eliminate the contaminant if it is an illicit connection or discharge. As discussed previously, sampling for these parameters could most likely accompany cross connection elimination efforts on a watershed basis.

The City of Charleston should record dry weather flow sampling results from regulated outfalls that includes the following attributes:

Chlorine	pH
Surfactants	Temperature
Phenols	Scum
Copper	Turbidity
Abnormal Odor	Oil Sheen
Color	

At this time, permit guidance does not address issues regarding tidally influenced dry weather flows and flooding issues, and cannot provide guidance on how to mitigate problems specific to coastal areas. The City of Charleston, with the help of Woolpert, will develop methods for addressing the coastal issues as they relate to meeting the dry weather screening requirements. The ultimate SWMP will outline the sampling procedures and methodologies that the City chooses to adopt as well as schedules for completion. The plan will also include procedures and guidelines for tracking potential illicits.

Develop Illicit Education Program

See Section 3.1 and Section 3.2 for a summary of public education materials and public involvement activities that include illicit discharge education components.

3.4 Construction Site Storm Water Management (Minimum Measure #4)

Polluted storm water from construction sites is often conveyed to storm sewer systems that ultimately discharge into waterbodies such as rivers and streams or more likely nearby marshes or wetlands. Sediment from construction sites has been shown to exceed that from agricultural lands by 10 to 20 percent and 1,000 to 2,000 percent from forested land. During a small storm event, both large or small construction sites can contribute a significant quantity of pollutants to receiving water bodies. Although sediment is the primary concern, contaminants may include nutrients, pesticides, oils and grease, concrete truck washout, and construction chemicals and debris.

3.4.1 Requirements

NPDES Phase II legislation requires the following to comply with this minimum measure:

- Establishment of an ordinance or other regulatory mechanism requiring the proper implementation of sediment and erosion controls for construction sites with a land disturbance greater than or equal to one acre.
- Procedures for site inspection and enforcement control measures
- Sanctions to ensure compliance with local regulatory requirements (Ordinance or other regulatory mechanism)
- Implementation of procedures for site inspection and enforcement of sediment and erosion control measures

3.4.2 Current Activities and Resources

Storm Water Permitting

In 1991 the South Carolina Legislator adopted the South Carolina Stormwater Management and Sediment Reduction Act. This Act and accompanying regulation established the procedures and minimum standards for a statewide program for storm water management and sediment reduction. The legislation also established a procedure by which a local government or conservation district could apply for program component delegation. Since 1991, the City of Charleston has deferred site-plan and sediment and erosion control review responsibilities, including maintenance inspections and enforcement, to the SCDHEC/OCRM (South Carolina Department of Health and Environmental Control / Ocean and Coastal Resource Management).

In conjunction with review by SCDHEC/OCRM, the City conducts a simultaneous review of proposed construction plans to ensure sound design procedures. The City has one plan reviewer dedicated to review of subdivision construction plans and a second reviewer who oversees all commercial and multi-family development. The construction plan reviewers receive incoming plans and disperse relevant portions of the design to the appropriate City departments. The primary focus of the two plan reviewers is to review both the plans and supporting calculations for water quantity issues related to storm sewer design, grading and drainage plans, and detention/retention peak flow requirements. Therefore, water quality issues such as sediment and erosion control measures, first flush requirements, and discharges to impaired waters or waters with known TMDLs is deferred to SCDHEC/OCRM (See Section 3.5.2 for further discussion on antidegradation requirements). Area contractors must obtain approval from both SCDHEC/OCRM and the City of Charleston prior to receiving the requisite construction permits.

In some instances, revisions requested by the City or SCDHEC/OCRM necessitates changes in both the original drainage and grading plan. Current policy requires developers to re-submit any significant changes to the City and SCDHEC/OCRM for re-approval as often as necessary.. Full approval is also required from each regulatory agency affected by the project such as the State Historic Preservation Officer (SHPO), the United States Army Corps of Engineers (USACE), and the U.S. Fish and Wildlife.

Technical Review Committee (TRC)

Proposed development meeting certain guidelines must gain approval from TRC prior to obtaining a building permit. The TRC includes staff members associated with building codes, planning and zoning, storm water drainage, traffic, and environmental issues that review the project for compliance with City ordinances. Projects requiring TRC approval include any new development or construction/renovation project excluding single family residential development. Applicants must submit preliminary design plans prior to the regularly scheduled meetings (3 meetings/month) in order to get the respective project on the agenda for discussion. The TRC allows the applicant to receive centralized comments from appropriate department representatives without setting up individual appointments or developing individual submittals.

Construction Inspections

SCDHEC/OCRM is the responsible entity for construction inspections and enforcement as it relates to storm water and sediment and erosion control. Similar to construction plan review however, the City performs its own engineering/construction inspections as well. Unlike SCDHEC/OCRM, City inspectors

are primarily responsible for overseeing numerous aspects of infrastructure construction such as the sub-grade, paving, pipe joints, and concrete. Therefore, the inspections may not be as thorough for storm water and sediment erosion control requirements as that of SCDHEC/OCRM, but does include visual observations for measures such as vegetative stabilization, properly installed silt fencing, and/or the presence of required detention/retention ponds. For commercial development, City inspectors look for off-site sedimentation and potential impacts within the City ROW.

Design Manual

The City of Charleston is developing a Public Improvement Standards and Specifications "Design Manual". The intent of the manual is to provide standards for design and construction of road and drainage systems. The manual is being developed to streamline the entire development approval process and to produce some uniformity in construction site development throughout the City. The sections within the manual are outlined as follows: general overview of the construction permitting process, required plan information, design criteria, drainage and stormwater management, and a section devoted to construction inspections.

3.4.3 Action Plan Recommendations

Investigate Storm Water Permitting Options

Construction oversight at the state level is not the most effective method for enforcement of water quality regulations. Due to the number of land disturbance permit requests received by SCDHEC/OCRM, it is very difficult for their limited staff to thoroughly inspect or become familiar with every project site. Staffing problems make enforcement and inspections difficult. It is the opinion of SCDHEC that familiarity with the local infrastructure and having staff members that reside in proximity to project sites makes site inspections and enforcement much more effective. Contractors are more likely to maintain their respective BMPs knowing that inspectors may drive by the project site on a daily basis. The creation of the delegated review program within the South Carolina Stormwater and Sediment Reduction Act was designed for this reason.

The NPDES program is the first legislation to force the burden of any form of storm water management on the local level. In the proposed draft of the SC General Permit which was subsequently repealed (see Section 2.0, NPDES Storm Water Management Program), SCDHEC was attempting to require that permitted MS4s in the NPDES program assume the responsibility of plan review, inspections, and enforcement. This addition to the mandated EPA requirements for the construction and post-construction

minimum measures was not included within the requirements for the current individual permit application. However, it is quite clear that the SCDHEC will attempt to require delegated review status for small MS4s at the local level in the future.

Although the current construction joint permitting system between SCDHEC/OCRM and the City appears adequate, the City should begin to evaluate the feasibility of assuming delegated review responsibilities. Since the City has taken it upon itself to review portions of each land disturbance submittal, the additional responsibility of evaluating water quality implications and sole responsibility for inspections and enforcement may not be overwhelming. However, the City should evaluate current and expected resources needed to perform these duties, the training required for a successful program, the changing role of SCDHEC/OCRM and its implications, and any potential partnerships with Charleston County or other entities.

Provide Training Opportunities

The primary component of a successful delegated review program is ensuring adequate training for City employees, area contractors, and the design community:

Construction Plan Reviewers

City construction plan reviewers do not currently receive any formalized training. Plan reviewers should not only receive periodic training on their current review responsibilities, but should receive additional training on water quality related plan review issues should the City ultimately assume or be forced to assume delegated review status. Although the SCDHEC/OCRM would likely still be involved in some capacity, delegated review status *could* include oversight of sediment and erosion control, first flush requirements, anti-degradation restrictions, and additional requirements for discharges to impaired waters or waters with established TMDLs. Training could either be developed in-house or should be provided by an outside entity to ensure consistency for development projects within the City.

Construction Inspectors

Although City construction inspectors receive training in numerous aspects of the construction process, inspectors do not receive any form of training in sediment and erosion control. Inspectors should be trained on proper installation techniques for approved City BMPs such as silt fencing, erosion control matting, seeding techniques, and check dams. Inspector training could also be provided by the City or could be received from an outside source.

Contractor Education Programs

The City of Charleston should investigate the development of an education program directed at area contractors. Contractors could be educated on the detrimental effects of sediment transport and informed of the new one-acre threshold used for land disturbance permit requests. Many contractors ignore current sediment and erosion control requirements or perform the minimal requirements and maintenance needed to avoid complaints. An informative presentation with evidence on sediment transport could alter their views on proper construction and maintenance of these controls. The presentation could include time for a question and answer session and take suggestions to improve the review and inspection process. Contractors could be also be updated on any new fines or penalties for non-compliance that result from new ordinances adopted by the City.

Continue Development of Design Manual

The City should continue the current development towards a comprehensive City design manual. The manual will likely help both City staff and the design community. However, the City should investigate inclusion of BMP guidelines for water quality parameters other than sediment. Although helpful for the design community, the City may also want to investigate separation of the construction inspection section of the manual specifically for the City building official and area contractors. This information should be included in the training programs mentioned previously.

3.5 Post-Construction Storm Water Management (Minimum Measure #5)

Post-construction storm water management is necessary because runoff from developed areas can significantly impact receiving waterbodies. This impact typically occurs in two forms: The first impact is due to an increase in the type and quantity of pollutants in storm water runoff. As surface water flows through these sites, it may transport harmful contaminants such as oil and grease, pesticides, heavy metals, and various nutrients, (e.g., nitrogen and phosphorous). These pollutants become suspended in the runoff and are conveyed to receiving water bodies, such as lakes and creeks.

The second post-construction runoff impact typically occurs as a result of increased storm water runoff rates and volume due to an increase in impervious surfaces. This increase in runoff has not only been shown to interrupt the natural water balance of percolation into the ground, but also may impact the receiving waterbody through streambank scouring and downstream flooding.

3.5.1 Requirements

The NPDES Phase II program will require that the City of Charleston address the following requirements:

- Develop and implement a combination of both structural (ex. detention/retention ponds, grass filters) and non-structural BMPs (ex. master planning, zoning restrictions)
- Create an ordinance or regulatory program that requires the use of post construction runoff controls
- Ensure adequate long-term operation and maintenance of the controls

3.5.2 Current Activities and Resources

Structural BMPs

The stormwater permitting process discussed previously in the Construction Site Storm Water Runoff Management section includes both sediment and erosion control as well as peak runoff rate requirements during and after construction. A representative of the City indicated that the City of Charleston currently evaluates peak runoff calculations or water quantity issues, while SCDHEC/OCRM focuses *primarily* on sediment and erosion control or water quality issues. The following sub-sections discuss the current post construction requirements or lack of such requirements from each entity.

SCDHEC/OCRM Requirements

SCDHEC/OCRM requires various types of sediment and erosion control measures to be included on construction plan submittals. Currently, for sites greater than ten acres, design engineers must supply quantitative data supporting trapping efficiencies for BMPs such as sediment traps or ponds. These BMPs are typically designed to trap sediments and particulate matter during construction activities. Therefore, additional post construction threats to water quality from contaminants such as nutrients and bacteria are not currently a factor in the design of these BMPs. However, for any land disturbance greater than 25 acres that discharges to a receiving waterbody with known water quality problems, SCDHEC/OCRM has developed stringent construction and post-construction water quality requirements.

Antidegradation Requirements

In November 1999, SCDHEC/OCRM issued antidegradation requirements for activities contributing to non-point source (NPS) pollution to impaired waters or waters with an approved total maximum daily load (TMDL). The SCDHEC/OCRM literature states that "when the available assimilative capacity of a waterbody is not sufficient to ensure maintenance of water quality standards for a parameter of concern with an additional load to the waterbody, then the department will not allow a permitted net increase of loading for the parameter of concern…". Therefore, design engineers for land disturbance activities greater than 25 acres must provide assurance to SCDHEC/OCRM that proposed development will not contribute additional loadings to the given impairment *in perpetuity* (construction and post-construction). Current available technology to provide such assurance is extremely limited, but must be provided by evaluating proposed landuse and expected runoff constituents, choosing from various types of structural BMPs, designing treatment trains using these BMPs, and/or water quality monitoring.

For waterbodies with approved TMDLs, assurance or supporting evidence must show or estimate that contaminants will not exceed in-stream water quality standards. Therefore, if the approved TMDL includes NPS contributions then discharges can include the parameter of concern within the provided discharge limitations. However, for waterbodies deemed impaired with no approved loading allocation, the discharge must contain *no* additional contribution of the given constituent.

City of Charleston Requirements

The primary requirement of the City is that peak runoff rates during existing conditions be maintained or reduced *during and after* construction. Peak runoff rates are commonly maintained using site specific detention/retention ponds. Although the primary intention of retention ponds is to regulate peak flow,

some sediment trapping is generally experienced as a by-product of holding times. Retention ponds for larger disturbed areas are designed for both sediment trapping during construction and for long term peak runoff control. With adequate maintenance and proper design, peak flow rates and sediment transport from these BMPs can be maintained during post construction conditions.

Long-Term Operation & Maintenance

Land disturbance permit applications must also include a description of the operation and maintenance (O&M) program for the storm water management and/or sediment control BMP. Periodic maintenance schedules are generally included on the construction plans in the sediment and erosion control notes or with the detail of the detention/retention pond outlet structure. However, upon receiving the notice of termination (NOT), the contractor/developer is no longer responsible for operation and maintenance of the BMP. Ownership and the respective O&M of the BMP shift to homeowners associations (HOA) or private entities. Although the primary purpose of the BMPs is to control surface runoff, these structural controls typically do not receive regular maintenance. Unfortunately, maintenance of these structures is usually crucial for them to function properly.

Representatives from both construction plan review and storm water maintenance stated that the City of Charleston owns a limited number of detention/retention ponds. However, the City has been involved in some efforts to maintain both City owned and HOA owned retention ponds. In partnership with the Parks department, the City hired an outside entity to spray herbicides at the Ardmore ponds that were overgrown with vegetation. In addition, the Parks department performs some maintenance activities at ponds located within the City parks system (see Section 3.6.2-Current Activities and Resources, Parks department). The City has assisted some local HOAs by bringing in a representative from DNR to discuss low cost alternatives to excessive vegetation in their own neighborhood ponds, while a member of construction plan review has provided some HOAs with vegetation management advice.

Non-Structural BMPs

Non-structural BMPs such as zoning restrictions and/or sound master planning are often more effective in minimizing receiving water impacts than properly designed structural BMPs. In many cases, non-structural BMPs guide the usage of potential structural BMPs such as riparian buffers, regional detention, low impact development techniques, and open space requirements. Non-structural BMPs are far reaching and can allow controlled development for an entire City or in selected areas.

Zoning Restrictions

A representative of the Planning and Neighborhoods department indicated that known TMDLs or water quality impairments were considered when developing City zoning restrictions. However, known water quality concerns were only one of the many factors that received consideration when developing proposed zoning or rezoning for a particular area. For a detailed audit of existing legal authority including current zoning restrictions and stringent water quantity related restrictions specific to the Church Creek watershed, see Section 4.0, Legal Authority.

Master Planning

The City Planning and Neighborhoods department uses master planning in partnership with zoning restrictions to guide development within City limits. However, neither water quantity or water quality related storm water issues are currently included in the development of the master plans.

3.5.3 Action Plan Recommendations

Structural BMPs

Post-construction peak runoff rates and sediment transport from local BMPs are regulated and being controlled by the City and SCDHEC/OCRM, when properly designed and maintained. Although sedimentation is not typically a post-construction concern, a pond will continue to trap sediments and other particulates after vegetative stabilization. The City should therefore evaluate the current policy of detention pond ownership and maintenance, for structures within City limits. It is unlikely that many private entities have the capability of operating and maintaining their respective ponds, and even fewer local HOAs have the resources or expertise to perform any level of periodic maintenance. Therefore, the City should evaluate the current ownership policy and develop alternatives for ensuring continued routine maintenance. The City should begin by investigating the feasibility of maintaining the structures by either the Storm Water division or Parks department.

The City could evaluate manpower available to perform routine inspections and minor repairs, as well as major repairs to outlet structures or emergency spillways. Protocol for proper inspections could be developed that includes a checklist of items to investigate during each routine inspection. Preventative maintenance issues such as debris accumulation on trash racks and overgrown vegetation should be clearly identified and checked upon each inspection. As stated in Section 3.5.2, the Parks department already provides some level of maintenance at ponds located within the Parks system. In addition, the Storm Water Maintenance divisiondiscussed later in Section 3.6.2 currently maintains all City drainage

ditches and inlet structures. These systems experience similar problems as retention ponds and would require little transition or training of field crews to perform routine maintenance activities. In addition to routine inspections, guidelines should be adopted for BMP inspections after major storm events.

If the City could not provide such maintenance, the Engineering division could investigate developing guidelines for local entities and HOAs to perform inspections and/or routine maintenance. The HOAs could investigate increasing existing regime fees to cover periodic maintenance by the City or an outside entity based on this guidance. It is unlikely that the City maintains an inventory of local retention ponds or other structural BMPs, but an inventory would be crucial before beginning any City-wide maintenance efforts. The inventory could also include an audit of some selected structures to identify common maintenance needs and services provided during routine maintenance visits. Measures such as these will ensure that peak flows downstream are maintained and that particulates associated with post-construction transport is minimized.

In partnership with the SCDHEC/OCRM, the City may also want to begin investigating the use of structural BMPs designed to trap constituents other than sediment. The antidegradation requirements discussed in Section 3.5.2 will remain in the future and will most likely be placed on additional waterbodies, as SCDHEC/OCRM sampling and water quality monitoring efforts continue. Unfortunately, the available methods and techniques to prove that storm water runoff does not contribute to a given impairment are extremely limited. However, SCDHEC/OCRM has recently developed a computer model called the Integrated Design and Evaluation of Assessment Loadings (IDEAL) model that provides quantitative expected trapping efficiencies for nutrients, phosphorous, fecal coliform bacteria, and total suspended solids (TSS). At a minimum, the Engineering division should familiarize itself with the model and be able to provide advice to the design community in the event that runoff from proposed development discharges to impaired waters or waters with known TMDLs.

Non-Structural BMPs

There are many different types of non-structural BMPs that the City could choose to implement to address both water quantity and water quality concerns. Although representatives of zoning indicated that known water quality problems were used to guide zoning restrictions, the City does not include such consideration in the development of master plans. The Planning and Neighborhoods department stated that neither the affects to water quality or quantity are evaluated during the master planning process. Due to frequent flooding and the number of waterbodies deemed impaired in the Charleston area, consideration of these affects during the master planning process could be invaluable to avoid future problems after development.

The City should attempt to implement non-structural BMPs in specific watersheds based on a needs assessment, such as the stringent water quantity restrictions in the Church Creek watershed (see Section 4.2, Existing Ordinances). The City could assess each watershed for flooding or water quality problems as identified by the SCDHEC 303d list (see Section 2 and Section 3 of the Appendix) and prioritize accordingly. For example, if Long Branch Creek in West Ashley was experiencing flooding problems and had been deemed impaired for nitrogen, the City could develop ordinances requiring extended detention and restrictions on homeowners for application of fertilizers for that particular watershed. This could also include restrictions on any new industry that may discharge effluent containing some level of nitrogen. The City could investigate the use of the following BMPs:

- Regional detention
- More stringent detention requirements
- Pervious pavement
- Runoff volume restrictions
- Open space requirements
- Riparian buffers
- Revise master plans
- Artificial wetlands

Non-structural BMPs such as these, many of which would guide the use of structural BMPs on a watershed approach, could provide great benefits to Charleston area receiving waters.

3.6 Pollution Prevention and Good Housekeeping (Mnimum Measure #6)

The final control measure required by the NPDES Phase II program involves the examination and possibly alteration of municipal operations. This measure requires that municipalities evaluate their actions to ensure a reduction in the amount and type of pollution that accumulates on streets, parking lots, open spaces, and storage and vehicle maintenance areas that discharge into local waterbodies. In addition, this measure requires an evaluation of results from land development actions that may be environmentally damaging. The primary intent of the USEPA with this measure is to improve and protect water quality by altering the performance of municipal operations. However, the USEPA also feels that this measures could also result in increased cost savings for municipalities through proper and timely maintenance of storm sewer systems.

3.6.1 Requirements

To comply with this minimum control measure, the City will be required to address the following requirements:

- Develop an operation and maintenance program with the objective of preventing or reducing pollutant runoff from municipal operations into the City storm sewer system.
- Include training of City operations personnel on how to incorporate pollution prevention / good housekeeping techniques into City operations. This could include park and open space maintenance, fleet and building maintenance, new construction and land disturbances, and storm water system maintenance.

Guidelines for implementing these measures could include structural and non-structural measures to reduce floatables and other pollutants, controls for reducing or eliminating the discharge of pollutants from areas such as roads and parking lots, maintenance and storage areas (including salt/sand storage and snow disposal areas), and waste transfer stations.

3.6.2 Current Activities and Resources

Storm Water Maintenance Division

The City of Charleston operates a storm water maintenance division. The division employs a staff of 45 personnel whose primary responsibility is maintenance of drop inlets/catch basins and open drainage channels, as well as construction of similar drainage ditches or small capital improvement projects within

the City limits. Maintenance equipment currently includes four vactor trucks. The most common type of routine maintenance or work order includes vacuuming catch basins and trimming or removing excess vegetation from City ditches.

The City has developed a grid system for routine inspections/preventative maintenance and a detailed work/order system to prioritize complaints and immediate repairs. Each quadrant of the grid system receives a maintenance inspection on a one to two-year rotation; however, the work/order system typically takes priority over these inspections. Upon receiving a complaint, one of five crews responds to the call and prioritize the need for repair. Crewmembers perform a preliminary evaluation and prioritization of the structure, which is subsequently logged into a Microsoft Access database for prioritization of the repair. The division also uses a GIS to develop hard-copy location maps for each of the respective complaints. The goal of the Storm Water division is to clean approximately 1.2 million linear feet of drainage ditches annually. Although a representative of the division was unaware of the total length of the drainage ditches within the City limits, crews have typically performed maintenance on approximately 1 million feet per year.

Parks Department

The Parks department of the City of Charleston is unique from other municipalities in that the department is responsible for maintenance of all 90 City-owned parks and 185 City-owned structures. This includes both exterior and interior day-to-day maintenance. The department employs approximately 150 staff members of which approximately 135 are full-time crewmembers. Responsibilities of the department range from repair of HVAC, electrical, and sanitary sewer laterals to painting, mowing, and anti-litter programs. The Storm Water division is responsible for any drainage ditches or storm sewer system within City parks, but there are numerous other responsibilities of the department that *could* potentially impact surface water quality.

The maintenance responsibilities for City-owned structures include the City fleet maintenance facility and two City equipment yards. Due to the nature of the work associated with a typical city fleet maintenance facility, these facilities are viewed as a threat to water quality or a contributor of "storm water discharges associated with industrial activity". The section below discusses new NPDES requirements for municipally owned fleet maintenance centers.

Without proper BMPs, the two Parks department equipment yards could pose similar water quality threats. These yards are not currently regulated as separate entities in the NPDES program, but good

housekeeping techniques should be used in daily operations. Although fueling and maintenance of City owned vehicles is performed at the fleet maintenance facility, some minor preventative maintenance activities may occur at the equipment yards. These activities include a transfering debris, bulk storage, and daily vehicle wash downs. The yards have experienced problems with a floor drain mistakenly attached to the storm sewer system, frequent clogging of an oil/water separator and improper connection to the storm sewer system, a lack of oil/water separator at one facility, and the need for a wash rack. However, the City retained a consultant to perform a complete Phase II environmental assessment at the original facility and is currently addressing many of these items at both yards.

Due to the nature of maintaining aesthetics in the City park system, the department is actively involved in the application of Pesticides, Herbicides, and Fertilizers (PHFs). The department recognizes the risk associated with improper application of these products and requires appropriate field crew members to obtain a certification for PHF application through the Clemson University Extension Service. Although the majority of the City has minimal overland slopes, a representative of the Parks department stated that field crews typically use granular forms of PHFs to avoid potential wash-off associated with spray applications.

The Parks department also employs a small construction division. Although the Storm Water division does not typically maintain retention ponds, the Parks construction division does preventative maintenance and spillway improvements on ponds within the Parks system. Finally, the Parks department is also heavily involved in Public Education efforts. Since the majority of the target audience for these efforts is the general public, these programs are discussed in detail in Section 3.1, Public Education and Outreach and Section 3.2, Public Participation and Involvement of this report.

Environmental Services Division

The City provides sanitation services within its jurisdictional limits for both solid waste and yard debris. In addition to basic garbage collection, the environmental services division operates four street sweepers with non-regenerative or vactor capabilities. The division maintains a schedule for routine street cleaning, with priority given to high traffic areas such as Market Street and other areas on the peninsula. These areas receive street sweeping much more frequently, which greatly reduces the amount of litter/floatables entering the storm sewer system.

Individual NPDES Permits

Although not directly related to the MS4 permit coverage required for the City of Charleston, the City is required to obtain a separate NPDES Phase II permit for various other City owned entities. Under Phase I of the NPDES permitting program, eleven classes of industrial activity (including construction activities) required permit coverage. However, municipally owned industries other than airports, landfills, and power plants in small municipalities (<100,000 citizens) were exempt from NPDES permit coverage under the Intermodal Surface Transportation Efficiency Act of 1991. The Phase II regulations eliminate the previous exempt status.

Per the description of each category in the NPDES Phase I regulations and the Standard Industrial Classification (SIC) codes associated with each category, the City may have two entities that necessitate permit coverage. The fleet maintenance center and the City maritime center may both fall under category eight, transportation facilities. Although SCDHEC has not notified the City of these permit requirements; the City of Charleston may be required to obtain permit coverage for these entities by March 10, 2003.

Fleet Maintenance Center

The City has retained a consultant who is currently developing a Storm Water Pollution Prevention Plan (SWP3) and NPDES permit application for its fleet maintenance center.

City Maritime Center

The City notified representatives of the Maritime Center on February 18, 2003 of the upcoming permit requirements and submittal date.

City Staff Education Programs

Various members of the City staff attend South Carolina Association of Storm Water Managers (SCASM) quarterly meetings. The primary focus of the association and each of these meetings is storm water quality, with a wide-range of educational topics each quarter. The PHF staff training provided by the Parks department is the only other known City staff education program related to storm water quality. (see Section 3.4 for recommendations on erosion and sediment control training opportunities)

3.6.3 Action Plan Recommendations

Storm Water Maintenance Division

The majority of municipalities and local governments in SC do not maintain departments devoted to storm water maintenance. However, like other SC coastal communities, the draining of wetlands in the past created a detailed drainage network of storm sewer pipes and channels. The City has a great system in-place to address maintenance issues of the storm sewer network, but the efficiency of the system could be improved. Although a GIS is used to develop location maps for crewmembers responding to local complaints, the City should investigate integration of a GIS with the work/order database. Locations within the GIS requiring response could be spatially linked to the respective data within the division database. This could reduce man-hours involved in the development of reiterative location maps due to return visits or inspections. In addition, the division should investigate the creation of digital response forms for crewmembers to eliminate redundant data logging. Forms could be completed digitally in the field and simply downloaded daily into the overall database. The overall database would provide one central data source for previous complaints/responses and could be utilized to quickly reprioritize routine inspections in some areas due to more frequent or lack of complaints.

Like the digitization of the storm sewer, the City should also investigate digitization of the City-owned ditches and channels. A member of the Storm Water division stated that this had been discussed briefly, but never fully pursued. This would likely help ensure that each ditch received periodic maintenance and would allow the City to develop better quantitative measurable goals for permit compliance. As discussed in Section 3.5.3, the City should also investigate operation and maintenance of retention ponds within City limits.

Implement City Staff Education Programs

The City must establish a training program for their staff regarding the importance of storm water pollution prevention and good housekeeping. EPA recommends training for staff members who deal with parks and open space, the fleet maintenance center, new construction, and MS4 maintenance. The Engineering division could tailor brief programs for each of these entities with BMPs related to their respective operations. Group programs could be presented or pamphlets could be developed to be given to new employees during orientation. Programs for the Storm Water Maintenance division could be developed to educate crewmembers on the harmful affects of overgrown ditches and proper application of pesticides and herbicides to maintain these channels. Presentations or materials developed for fleet

maintenance employees could discuss the harmful effects of illicits such as used oil and anti-freeze, and how to properly dispose of these materials.

Hire Additional Storm Water Division Staff Members

The City should analyze the storm water management action plan recommendations in this document and determine which compliance activities could be handled using existing City personnel. This analysis should dictate whether the Engineering, Storm Water Maintenance, GIS, or other departments should hire additional staff members. The primary portions of the action plan which could warrant hiring additional staff members includes: digitizing the 1984 storm sewer inventory, performing the storm water system inventory and dry weather screening, providing maintenance of detention ponds, performing individual cross connection basin studies on the peninsula, and accepting responsibility as a delegated review for construction and post-construction permitting. One member of the City staff may also spend significant time developing annual reports in accordance with the NPDES requirements.

Investigate BMPs at Parks Department Equipment Yards

All City-owned vehicles (non-public safety) and equipment are maintained at the City Fleet Maintenance Center, excluding minor maintenance activities performed at the Parks equipment yards. Although the City has taken some steps to remedy known problems at the yards, the Engineering division should investigate the current BMPs that are utilized at these yards to ensure that water quality is not endangered. The City should make certain that oil water separators are utilized where applicable, and that floor drains or effluent from the separators is discharged to the sanitary sewer. The City should also develop a short spill prevention and response plan tailored for each location that identifies measures to take for spills, and schedules to follow for preventative maintenance. The plan could also include information on proper disposal of oil, fuel, grease, and other lubricating fluids. The SWP3 developed for the fleet maintenance center would be a useful guide in the development of BMPs for these facilities.

Submit Fleet Maintenance Center Permit

As stated under the Current Activities and Resources section, the City has been developing a SWP3 and permit application for runoff associated with industrial activity for the fleet maintenance facility. The City should simply check to make sure that the SWP3 has been completed and that the NOI has been submitted to SCDHEC.

Existing NPDES Municipal Permits

The City should develop a comprehensive listing of municipally owned and privately owned facilities that maintain NPDES permit coverage within the City limits. The City must ensure that the municipally owned facilities maintain permit coverage. The inventory of privately owned facilities will be helpful upon initiating illicit tracking procedures.

40 Legal Authority

The City of Charleston will be primarily responsible for controlling most discharges to its separate storm sewer system by possessing the authority to impose penalties sufficient to enforce compliance with the future Storm Water Management Plan (SWMP). In accordance with the requirements for the permit, State legislation that allows the municipality police powers, as well as existing and proposed City ordinances that pertain directly and indirectly to illicit discharges, construction, and post-construction, were researched for applicability.

41 State Granted Authority

The South Carolina Legislature passed the Home Rule Act in 1975. In general, this act granted local governments general police powers limited to the confines of the municipality and not inconsistent with the Laws of the State. Code of Laws of SC § 5-7-30 states, "Each municipality…may enact regulations, resolutions, and ordinances, not inconsistent with the Constitution and general law of this State, including the exercise of powers in relation to roads, streets, markets, law enforcement, health, and order in the municipality…". § 5-7-30 also indicates that fines and penalties for violation of a municipal ordinance may not exceed five hundred dollars or imprisonment of more than 30 days, or both.

In addition to allowable fines, civil penalties may be assessed by municipalities for certain ordinance violations. The 1991 Storm Water Management and Sediment Reduction Act, § 48-14-140, allows for a State delegated implementing agency to assess civil penalties up to one thousand dollars for violation of the terms and conditions associated with land disturbance for which a storm water management and sediment and erosion control plan is required. Each day of a violation constitutes a separate violation.

The City of Charleston is an incorporated municipality chartered by the State of South Carolina and thereby benefits from all the respective rights conferred by the State Constitution and the Code of Laws of South Carolina. Therefore, the City has the right to adopt and enforce ordinances related to regulating discharges to the storm water sewer system and waters of the State within the City limits.

4.2 Existing Ordinances

The Code of ordinances for the City was reviewed as they apply to the control of discharges to the municipal separate storm sewer system (MS4) as follows:

Illicit Discharge Detection and Elimination

Chapter 27 – Storm Drainage and Flood Control

Article 1 - In General

Sec. 27-4. Injuring or obstructing storm sewers or drains.

It shall be unlawful for any person to do or cause to be done any injury to or to cause an obstruction of any kind in any manner to any of the appliances or parts of the public storm sewers or drains.

Sec. 27-5. Consent required to uncover public storm sewer or drain.

It shall be unlawful for any person to uncover the public storm sewer or drain, or connection branches thereof, for any purpose or to make connection therewith, or to open any manhole or flush tank, unless and except with the approval and inspection of the department of public service.

Sec. 27-6. Removal of sewage by connection with storm drain prohibited.

It shall be unlawful for any person to make, or cause to be made, any connection for the removal of sewage from any premises, with any storm or subwater drain, or with any stream or watercourse within the limits of the city.

Sec. 27-8. Draining grease or oil on streets

It shall be unlawful for any person to drain or discharge grease, oil, gasoline or other petroleum products upon or into any right-of-way or storm drainage system.

Chapter 28 – Streets and Drainage

Article I – In General

Sec. 28-7. Depositing material into storm drainage system prohibited.

It shall be unlawful to dump, deposit or otherwise cause any trash, landscape debris or other material to be placed in any stream channel, pond or basin within the City of Charleston which regularly or periodically carries or stores stormwater.

The City of Charleston Environmental Control Ordinance

Article 2

Sec. 26-2, (f) It shall be unlawful for any owner, keeper or walker of any dog or cat to permit his or her dog or cat to discharge its excreta upon the property of the owner of the animal or upon the property of one who has assented thereto unless such owner, keeper, or walker immediately thereafter removes said animal's excreta from the public or private property in question.

Construction Site Storm Water Management

Chapter 27 – Storm Drainage and Flood Control

Article 1 - In General

Sec. 27-19. Stormwater management systems.

(a) Stormwater management systems for development in the city must adhere, at a minimum, to the requirements as established by S.C. Code § 48-14-10, et. seq. (Supp. 2000), the Stormwater Management and Sediment Reduction Act, and the regulations promulgated pursuant thereto, as the same may from time to time be amended.

(b) Consistent with requirements of the Stormwater Management and Sediment Reduction Act, in areas of the city deemed by the city engineer to require more stringent design specifications due to reoccurring flooding conditions, stormwater management systems shall be required to adhere to such development and design criteria as deemed necessary by the city engineer.

Article III – Stormwater Management Utility

Sec. 27-74. Establishment of stormwater management utility; administration; duties and powers. City council hereby establishes a stormwater management utility (utility) to carry out the purposes, functions and responsibilities herein set forth. The governing body of the utility shall be city council. The mayor shall administer the utility under the engineering division of the department of public service. The utility shall have the powers and duties hereinafter set out, which powers and duties are not necessarily exclusive to the utility, to wit:

(2) Regular inspections of public and private stormwater management facilities and measures and the construction thereof;

(3) Maintenance and improvement of stormwater management facilities that have been accepted by the city for that purpose;

(4) Plan review and inspection of sediment control and stormwater management plans, measures and practices;

(9) Any and all powers and duties delegated or granted to it as a local government implementing agency under the laws and regulations of the State of South Carolina, and the ordinances of this city.

Sec. 27-76. Regulation of land disturbing activity.

City council shall establish by ordinance a system regulating land disturbing activities, including, but not limited to, provisions for reviewing and approving stormwater management and sediment control plans; creating design requirements for such plans and land disturbing activities; and providing operational maintenance requirements for stormwater management facilities and measures.

Post-Construction Storm Water Management

Chapter 27 – Storm Drainage and Flood Control

Article III – Stormwater Management Utility

Sec. 27-19. Stormwater management systems.

(c)"Within the area of the city delineated as the Church Creek Basin in the Master Drainage and Floodplain Management Plan dated May 1984, … permanent stormwater management systems associated with new development shall be designed and constructed to maintain the post-development peak flow rates at or below the pre-development peak flow rates, and to detain the excess runoff volume difference between the pre-development and post-development conditions for the design storm having a duration of 24-hours and frequencies of 2, 10, 25, 50 and 100 years for a period of twenty-four (24) hours, with tolerances for a peak flow rate match for the 25- and 50-year storm events being plus or minus ten (10) percent, with all others matching pre post-development conditions. Detention facilities meeting these standards shall be designed and constructed to contain the excess volume for the 24-hour period and the volume required to release the post-development peak flow at or below the pre-development peak flow rates…"

Sec. 27-74. Establishment of stormwater management utility; administration; duties and powers.

City council hereby establishes a stormwater management utility (utility) to carry out the purposes, functions and responsibilities herein set forth. The governing body of the utility shall be

city council. The mayor shall administer the utility under the engineering division of the department of public service. The utility shall have the powers and duties hereinafter set out, which powers and duties are not necessarily exclusive to the utility, to wit:

(8) Water quantity and water quality management, including monitoring surveillance; and

(9) Any and all powers and duties delegated or granted to it as a local government implementing agency under the laws and regulations of the State of South Carolina, and the ordinances of this city.

Sec. 27-83. Notification of determination of impervious area for developed non-residential property.

The city engineer shall determine the amount of impervious area or semi-pervious area on each non-residential property and, if requested by the utility customer, on multi-family residential properties. A determination shall be made using aerial photographs and/or field checks where necessary. Upon application, a utility customer shall be provided a written determination of the amount of impervious area and/or semi-pervious area for which a fee has been established.

City of Charleston Zoning Code

Article 3 – Site Regulations

Part 8. Landscape Buffer Requirements

Sec. 54-347.1. Critical line buffer requirements.

Critical line buffers are naturally vegetated areas of specific widths, adjacent to all SCDHEC-OCRM critical lines. The primary purpose for critical line buffers is to protect water quality.

Article 2 – Land Use Regulations

Part 7. Planned Unit Development, PUD District

Sec. 54-258. Management of common open space and improvements.

a. The regulations below shall apply to all common open space and improvements, including all private streets, driveways, parking lots, uses, facilities and buildings provided in a PUD. All such common lands and improvements shall be established and maintained in accordance with the following requirements.

General Prohibitions

Chapter 1 General Provisions

Sec. 1-16. General penalty; continuing violations.

(a) Whenever in this Code or any section thereof no penalty is specifically provided for the violation of such Code or section, the court before whom an offender shall be tried may sentence him to pay a fine not exceeding five hundred dollars ($500.00) or serve a term not exceeding thirty (30) days in jail, or both. Each day any violation of this Code or section thereof shall continue shall, unless otherwise specifically provided, constitute a separate offense.

(b) Whenever a person is accused of committing an act which is susceptible of being designated as several different offenses, the judge of the municipal court, upon the trial of such person, shall be required to elect which charge to prefer and a conviction or an acquittal upon such elected charge shall be a complete bar to further prosecution for the alleged offense.

Sec. 1-20. General penalty.

Any person or entity violating any provision of the Code of the City of Charleston, or any code adopted pursuant thereto, within the corporate limits of the City of Charleston, may be issued a uniform ordinance summons. Issuance of the uniform ordinance summons shall vest jurisdiction in the municipal court to hear and dispose of the charge for which the uniform ordinance summons is issued and served. The uniform ordinance summons may be issued by any city enforcement officer or any other city employees designated by the council as code enforcement officers. The bond amount for violation shall be prescribed by the chief municipal court judge.

4.3 Action Plan Recommendations

Illicit Discharge Detection and Elimination

Only illicit connections, obstructions, and some pollutants like pet wastes are covered by the existing ordinances. The ordinances should relate to all potential discharges that could affect water quality. *Chapter 28 – Streets and Drainage, Article I – Sec. 28-7*, should be revised to include a broader spectrum of illicit discharges. It could be construed from the existing ordinance that, with the exception of oil and grease, the dumping of only solid materials into the storm drainage system is prohibited.

Construction Site Storm Water Management

The current ordinance includes the South Carolina Stormwater Management and Sediment Reduction Act (SCSMSRA) by reference. With the exception of the change in the regulatory threshold from five to one acre, this reference meets the criteria required by the NPDES Phase II regulations for construction site management. With minor revision, these ordinances are adequate in their current form. However, if delegated review authority is granted to the City by SCDHEC/OCRM, then it may be prudent to incorporate the relative parts of the SCSMSRA along with additional local requirements into a comprehensive construction and post-construction ordinance.

Post Construction Site Storm Water Management

The City has an effective planning and zoning program that incorporates post construction restrictions such as critical line buffers. The current ordinances allow the City significant control of post construction design elements. Some language could be added to specifically grant regulatory discretion of the selection, design, and maintenance requirements of post construction BMPs, based on sound and defensible judgement, to the City. Coordination between the Planning and Engineering departments should be established to accomplish effective review and enforcement procedures.

General Prohibitions

The fines and penalties indicated in *Chapter 1 General Provisions* are consistent with the State law and, therefore, require no revisions. There needs to be a "right-of-entry" provision added to either the *General Provisions* chapter or to each chapter that relates to storm water management. The following section (found in chapter five of the current City ordinance) is an example of appropriate language:

Chapter 5 Animals

Article I. - In General

Sec. 5-2. Inspections and right of entry.

(a) Whenever it is necessary to make an inspection to enforce any of the provisions of or perform any duty imposed by this chapter, or other applicable law, or whenever the superintendent or any authorized member of the division has probable cause to believe that there exists in any building or upon any premises any violation of the provisions of this chapter or other applicable law, the superintendent or any authorized member of the division is hereby empowered to enter such property at any reasonable time and to inspect the same and perform any duty imposed upon the superintendent or any authorized member of the division by this chapter or other applicable law, but only if the consent of the occupant or owner of the property is freely given or a search or inspection warrant is obtained as hereinafter provided:

(1) If such property is occupied, he shall first present proper credentials to the occupant and request entry, explaining his reasons therefor; and

(2) If such property is unoccupied, he shall first make a reasonable effort to locate the owner or other persons having charge or control of the property, present proper credentials and request entry, explaining his reasons therefor; and

(3) If such entry is refused or cannot be obtained because the owner or other person having charge or control of the property cannot be found after due diligence, the superintendent or an authorized member of the division shall obtain a warrant to conduct a search or inspection of the property.

(b) Notwithstanding any other provision of this chapter, the superintendent or any authorized member of the division shall have the authority to enter upon any property to enforce the provisions of this chapter if a violation of such law is being committed in the presence of such officers of the division. "Committed in the presence of such officers of the division" shall not be construed to refer to any alleged violation of this chapter or other applicable law which is committed within any building or other enclosed structure or yard unless such officer is also lawfully within such building or enclosed structure or yard. No member of the division or any other officer shall enter a residence or place of business for any purpose without a warrant, unless the consent of the owner or occupant is freely given to such entry.

Summary

An ordinance revision package related to storm water issues required by or resulting from the NPDES Phase II MS4 permit needs to be developed. A work session including representatives from the effected City departments should be conducted to finalize the draft ordinance revisions for submission to the City legal staff for review and approval. The resulting ordinances should be submitted to City council for ratification.

5.0 Proposed SWMP & Associated Costs

Representatives of Woolpert developed a NPDES Phase II storm water permit application for the City of Charleston based on the audit information contained within this report. The referenced application was submitted by the City to SCDHEC on March 10, 2003 in order to comply with the permitting deadlines as discussed in Section 2.0. The application outlined BMPs associated with each minimum measure that the City proposed to complete over the next five years or first permit term. The following tables show each of these BMPs, as included in the permit application, along with approximate planning level costs. Costs were based on estimates provided by the APWA, experience with other NPDES Phase I and Phase II communities, and recommended BMPs within the permit application. For further discussion regarding any of the proposed BMPs, see previous sections of this report.

5.1 Public Education and Outreach (Minimum Measure #1)

PERMIT REQUIREMENTS – Minimum Measure #1
Requirement Description
• Implement a public education program to distribute educational materials or conduct equivalent outreach activities about the impacts of storm water discharges on water bodies, and the steps that the general public can take to reduce pollutants in storm water runoff.

BEST MANAGEMENT PRACTICES – Minimum Measure #1			≈ $35,000
Research Existing City Educational Materials			
Milestone	**Schedule**	**Frequency**	**Responsible Party**
Evaluate all Parks and Recreation department environmental educational materials related to storm water	12 months	Once	Public Service – Eng. Div. / Environmental Educators
Evaluate current potential City communications mediums	12 months	Once	Public Service – Eng. Div. / Environmental Educators
Measurable Goal:			
• Research existing educational materials for use in development of the education program			
Research Other Existing Educational Materials			
Milestone	**Schedule**	**Frequency**	**Responsible Party**
Collect and evaluate current storm water related materials from various agencies such as SCDHEC, DNR, Clemson Extension, and OCRM	12 months	Once	Public Service – Eng. Div. / Environmental Educators
Collect and evaluate educational materials and website utilized by Phase I regulated communities	12 months	Once	Public Service – Eng. Div. / Environmental Educators
Measurable Goal:			
• Research existing educational materials for use in development of the education program			
Develop Comprehensive Public Education Program			
Milestone	**Schedule**	**Frequency**	**Responsible Party**
Allow existing City environmental educators to create a comprehensive NPS water quality education program	18 months	Once	Environmental Educators
Implement components of education program	60 months	On-going	Environmental Educators
Amend program and goals as necessary	N/A	Annually	Environmental Educators
Measurable Goal:			
• Develop a comprehensive program to educate the community about storm water quality			

5.2 Public Involvement/Participation (Minimum Measure #2)

PERMIT REQUIREMENTS - Minimum Measure #2

Requirement Description

- Comply with state, and local public notice requirements when implementing a Public Involvement/Participation program.

BEST MANAGEMENT PRACTICES - Minimum Measure #2 **≈ $20,000**

Research Existing City Public Involvement Programs

Milestone	Schedule	Frequency	Responsible Party
Evaluate all Parks and Recreation department environmental education public involvement programs related to storm water	12 months	Once	Public Service – Eng. Div. / Environmental Educators

Measurable Goal:

- Research existing educational programs for use in development of the public involvement program

Research Other Public Involvement Programs

Milestone	Schedule	Frequency	Responsible Party
Research existing types of programs developed by other agencies such as school programs, community clean-up events, and civic programs	12 months	Once	Public Service – Eng. Div. / Environmental Educators

Measurable Goal:

- Research existing educational programs for use in development of the public involvement program

Develop Comprehensive Public Involvement Program

Milestone	Schedule	Frequency	Responsible Party
Allow existing City environmental educators to create a comprehensive NPS water quality public involvement program	18 months	Once	Environmental Educators
Implement selected components of the involvement program	60 months	On-going	Environmental Educators
Amend program and goals as necessary	N/A	Annually	Environmental Educators

Measurable Goal:

- Develop a comprehensive, interactive program to involve the community in storm water quality initiatives

5.3 Illicit Discharge Detection and Elimination (Minimum Measure #3)

PERMIT REQUIREMENTS – Minimum Measure #3
Requirement Description
• Develop, implement and enforce a program to detect and eliminate illicit discharges.
• Develop a storm sewer system map showing the location of all outfalls and the names and location of all waters of the State that receive discharges from those outfalls.
• Prohibit non-storm water discharges into your storm sewer system.
• Develop a program to identify and address non-storm water discharges that significantly contribute pollutants to the SMS4, illegal dumping.
• Inform public employees, businesses, and the general public regarding the impacts associated with illegal discharges and the improper disposal of waste.

BEST MANAGEMENT PRACTICES – Minimum Measure #3 **≈ $375,000**

Develop Outfall Inventory

Milestone	Schedule	Frequency	Responsible Party
Obtain existing digital outfall inventory of peninsula	12 months	Once	Public Service – Eng. Div. /
Digitize outfalls as identified in the 1984 storm sewer inventory	24 months	Once	Public Service – Eng. Div. / GIS Department
Delineate individual basins and develop watershed approach	12 months	Once	Public Service – Eng. Div. /
Conduct field inventory and verification of digitized outfalls	36 months	On-going	Public Service – Eng. Div./

Measurable Goal:

- Develop City-wide outfall inventory of major outfalls for use in detecting and eliminating illicit discharges

Eliminate Sanitary Sewer Illicit Discharges

Milestone	Schedule	Frequency	Responsible Party
Repeal illicit discharge consent order	12 months	Once	Public Service – Eng. Div. / Legal Department
Reevaluate protocol for peninsula basin studies	18 months	Once	Public Service – Eng. Div./ CPW SCDOT
Formalize communications with Charleston CPW	12 months	Once	Public Service – Eng. Div. / CPW
Implement revised protocol for basin studies	60 months	On-going	Public Service – Eng. Div./ CPW SCDOT

Measurable Goal:

- Improve water quality within City limits by eliminating illicit discharges

BEST MANAGEMENT PRACTICES (CONTINUED) – Minimum Measure #3			
Eliminate Other Illicit Discharges			
Milestone	**Schedule**	**Frequency**	**Responsible Party**
Evaluate options for implementation of dry weather screening during outfall inventory or individual basin studies	12 months	Once	Public Service – Eng. Div. /
Conduct dry weather screening	36 months	On-going	Public Service – Eng. Div. /
Measurable Goal: • Improve water quality within City limits by eliminating illicit discharges			
Revise Appropriate City Ordinances			
Milestone	**Schedule**	**Frequency**	**Responsible Party**
Evaluate existing legal authority related to this minimum measure	12 months	Once	Public Service – Eng. Div. / Legal Department
Submit draft revisions to City Council for review and approval	18 months	Once	Public Service – Eng. Div. / Legal Department
Pass final ordinance revisions	24 months	Once	Public Service – Eng. Div. / Legal Department
Measurable Goal: • Prohibit illicit discharges from entering the MS4 to improve water quality			

5.4 Construction Site Storm Water Runoff Management (Minimum Measure #4)

PERMIT REQUIREMENTS – Minimum Measure #4
Requirement Description
• Establish an ordinance to require erosion and sediment controls form construction activities disturbing one acre or greater.
• Requirements for construction site operators to implement appropriate erosion and sediment control BMPs;
• Requirements for construction site operators to control wastes that may cause adverse impacts to water quality;
• Procedures for site plan review of construction plans that consider potential water quality impacts;
• Procedures for receipt and consideration of information submitted by the public; and
• Procedures for site inspection and enforcement of sediment and erosion control measures.

BEST MANAGEMENT PRACTICES – Minimum Measure #4 ≈ $50,000- $150,000*

Revise Storm Water Management Ordinance

Milestone	Schedule	Frequency	Responsible Party
Find deficiencies in current ordinance regarding construction plan review activities and prepare draft storm water management ordinance	12 months	Once	Public Service – Eng. Div. / Legal Dept.
Submit draft revisions to City Council for review and approval	18 months	Once	Public Service – Eng. Div. / Legal Dept
Pass final ordinance revisions	24 months	On-going	Public Service – Eng. Div. / Legal Dept

Measurable Goal:

- To improve the quality of storm water runoff from land disturbances within the City limits

Refine Construction Approval Process Between the City of Charleston and OCRM

Milestone	Schedule	Frequency	Responsible Party
Refine coordination procedures between the City of Charleston construction permitting and OCRM plan approval to provide for more effective permit tracking, recording, and reporting procedures	12 months	Once	Public Service – Eng. Div./ OCRM
Began implementation of revised procedures	18 months	On-going	Public Service – Eng. Div./ OCRM

Measurable Goal:

- To improve the quality of storm water runoff from land disturbances within the City limits

BEST MANAGEMENT PRACTICES (CONTINUED) – Minimum Measure #4			
Develop Education Programs			
Milestone	**Schedule**	**Frequency**	**Responsible Party**
Develop a half-day contractor education course focusing on sediment and erosion control issues, permitting requirements, and proper BMP installation and maintenance	12 months	Once	Public Service – Eng. Div.
Provide half-day contractor education course	18 months	Annually	Public Service – Eng. Div.
Develop a half-day course for City building inspectors focusing on sediment and erosion control issues, permitting requirements, and proper BMP installation and maintenance	12 months	Once	Public Service – Eng. Div. / Public Service - Inspections
Provide half-day building inspector course	18 months	As needed	Public Service – Eng. Div. / Public Service - Inspections
Measurable Goal: • To educate contractors and inspectors on BMPs and proper installation to improve water quality			

* Although not included as a BMP in the permit application, SCDHEC may attempt to force construction and post-construction program delegation on the City within the proposed general permit. The cost range due to this potential reflects the City SWMP with and without assuming these responsibilities.

5.5 Post-Construction Storm Water Management (Minimum Measure #5)

PERMIT REQUIREMENTS – Minimum Measure #5
Requirement Description
• Develop and implement a strategy consisting of a combination of both structural and non-structural BMPs;
• Create an ordinance or regulatory program that requires the use of post construction runoff controls; and
• Ensure adequate long-term operation and maintenance of the controls.

BEST MANAGEMENT PRACTICES – Minimum Measure #5			≈ $15,000- $100,000*
Continue to Implement the South Carolina Sediment and Erosion Control Act			
Milestone	**Schedule**	**Frequency**	**Responsible Party**
Refine coordination procedures between the City of Charleston construction permitting and OCRM plan approval to provide critical post-construction BMPs	12 months	Once	Public Service – Eng. Div./ OCRM
Measurable Goal: • To ensure the quality of storm water runoff from newly developed sites within the City of Charleston in accordance with the conditions of their respective land disturbance permits.			
Develop Post-Construction Ordinances			
Milestone	**Schedule**	**Frequency**	**Responsible Party**
Develop ordinances requiring continued maintenance of post-construction BMPs	12 months	Once	Public Service – Eng. Div. Legal Dept.
Submit draft revisions to City Council for review and approval	18 months	Once	Public Service – Eng. Div. Legal Dept.
Pass final ordinance revisions	24 months	On-going	Public Service – Eng. Div. Legal Dept.
Measurable Goal: • To ensure the quality of storm water runoff from newly developed sites within the City of Charleston is maintained.			

* Although not included as a BMP in the permit application, SCDHEC may attempt to force construction and post-construction program delegation on the City within the proposed general permit. The cost range due to this potential reflects the City SWMP with and without assuming these responsibilities.

5.6 Pollution Prevention / Good Housekeeping (Minimum Measure #6)

PERMIT REQUIREMENTS – Minimum Measure #6

Requirement Description

- Develop an operation and maintenance program, including a training component, with the objective of preventing or reducing pollutant runoff from municipal operations into the City's storm sewer system.

BEST MANAGEMENT PRACTICES – Minimum Measure #6 **≈ $50,000**

Obtain Separate Permit Coverage for Fleet Maintenance Center

Milestone	Schedule	Frequency	Responsible Party
Apply for coverage under the state industrial NPDES general permit for the fleet maintenance facility when available	12 months	Once	Public Service – Fleet Management
Create SWP3 for fleet maintenance facility	12 months	Once	Public Service – Fleet Management
Begin implementation of SWP3 for fleet maintenance facility	24 months	On-going	Public Service – Fleet Management

Measurable Goal:

- Apply for industrial NPDES coverage for the fleet maintenance facility and maintain SWP3

Provide Appropriate Staff Training

Milestone	Schedule	Frequency	Responsible Party
Identify City operations whose staff require water quality related training	12 months	Once	Public Service – Eng. Div.
Develop BMPs for appropriate City facilities and training for respective field staff	18 months	Once	Public Service – Eng. Div.
Begin implementation of training program	24 months	Annually	Public Service – Eng. Div.

Measurable Goal:

- Train staff to avoid water quality impacts associated with their responsibilities and activities.

Develop BMPs for Parks Department Equipment Yards

Milestone	Schedule	Frequency	Responsible Party
Develop BMPs including spill response plan, preventative maintenance schedules, and proper disposal procedures	12 months	Once	Public Service – Eng. Div. Parks Department
Train City facility and field staff on the procedures for spill response activities, preventative maintenance, and proper disposal	18 months	Once per permit cycle	Public Service – Eng. Div. Parks Department

Measurable Goal:

- To develop BMPs and training to avoid water quality impacts associated with these facilities